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Strategic Forces Technical Assessment Review (U)

31 MARCH 1983

Pg. 313

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STRATEGIC FORCES TECHNICAL ASSESSMENT REVIEW (U)

31 March 1983

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efforts. The United States force is aging: the Titan II is being phased out; Minuteman IIs have been in the field since 1965; and our most modern intercontinental ballistic missile, Minuteman III, was first tested over 15 years ago. The United States intercontinental ballistic missile force is based on the technology of the 1960s. The bulk of the Soviet intercontinental ballistic missile force has been deployed since 1974 and there have been several significant improvements and modifications since then.

(U) The most visible and destabilizing aspect of the Soviet strategic force modernization program has been the emphasis on significant accuracy improvements and payload fractionation (MIRVing) in their intercontinental ballistic missile forces. These improvements have provided the capability to attack and destroy United States hardened military assets. Shortfalls in U.S. hard target kill capability create a dangerous asymmetry in United States/Soviet Union strategic capabilities. An important implication of this asymmetry is that United States intercontinental ballistic missiles have become vulnerable to a preemptive strike if not launched before a Soviet attack is complete.

(U) During a crisis the Soviets might believe that this prompt, hard target kill advantage could achieve decisive results through a preemptive strike on U.S. strategic forces. A successful attack would severely curtail U.S. response options, and seriously weaken the U.S. ability to terminate the conflict short of surrender. Without effective, quick reacting weapons, the United States would not have the prompt capability to retaliate against such high priority targets as command and control structures and strategic nuclear forces. Accordingly, the Soviets would have increased confidence concerning successful nuclear or large scale conventional actions against the United States or its allies.

(U) In a parallel effort, the Soviets have increased both the number and hardness of the installations they value most to support the conduct of nuclear war, which are intercontinental ballistic missile silos and command and control facilities. These are military installations that would need to be attacked early in the course of a nuclear response by the United States. This increase in the hardness and number of these critical installations has significantly degraded U.S. retaliatory effectiveness.

(U) The combination of U.S. vulnerability to certain types of attacks and the degraded U.S. capability to hold time-urgent, hard targets at risk has reduced the stability

of the nuclear balance. If uncorrected, this effect will likely encourage Soviet perceptions of the balance of strategic forces and, therefore, the potential for victory in a nuclear war.

(U) To preserve the benefits the Triad provides, U.S. efforts to solve these strategic force problems have focused on correcting the deficiencies in its current intercontinental ballistic missile force. However, the problems of cost, technical viability, and environmental disruption which have been encountered while trying to find an acceptable basing solution for intercontinental ballistic missile modernization have led some to propose that the United States should solve those problems by further modernizing and increasing the other two elements of the Triad, in effect, to move toward a Dyad.

(U) A move to a Dyad would incur significant military and political risk. By essentially abandoning its intercontinental ballistic missile force, the United States would give up its highly selective, time-urgent, counter force capability; thereby conceding a substantial military advantage to the Soviet Union. The United States would also be conceding a significant political victory to the Soviets since we would be abandoning the intercontinental ballistic missile force in the face of a threat to which we chose not to respond. In addition, the advantages of diversity discussed previously would be seriously degraded. The Soviets would have the opportunity to concentrate their efforts and resources on defeating the remaining elements through attack planning and development of counters to the submarine and bombers.

(U) Unilaterally providing the Soviets the opportunity to seize and maintain the initiative, increased vulnerability of the remaining two elements of the Triad, and heavy dependence on a limited communications system in order to effect the rapid response, would contribute to a substantial erosion in crisis stability. For these reasons, a decision to move toward a modernized Dyad would be a potentially dangerous action for the United States to undertake.

Summary (U)

(U) To insure a continuing viable strategic posture, the United States intercontinental ballistic missile forces should be improved as quickly as possible by accomplishing the following:

PREFACE (U)

Purpose (U)

(U) This report is to provide the technical assessment of closely spaced basing and other alternatives requested by the Congress. The scope is to address the following specific tasks:

a. (U) A detailed technical and strategic assessment of the closely spaced basing system recommended to the Congress in November 1982, including modifications determined to be advisable.

b. (U) A detailed technical and strategic assessment of other basing systems for the Peacekeeper missile that might serve as alternatives to closely spaced basing, such as Minuteman silos, deep underground basing, multiple protective shelters and closely spaced basing incorporating mobility and deception, silos on the reverse side of mesas, and new widely spaced hard silos. Defense is included where applicable.

c. (U) A detailed technical and strategic assessment of different types of intercontinental ballistic missiles, together with appropriate basing modes that might serve as alternatives to the Peacekeeper missile, such as an enhanced and improved Minuteman missile, a common missile, and a small missile.

d. (U) A comparative technical assessment of the options considered in a, b, and c.

e. (U) A detailed comparative technical, strategic, and foreign policy assessment of alternatives to maintaining the intercontinental ballistic missile in the strategic Triad, including acceleration and/or expansion of the following program: Trident submarines with D-5 missiles.

Background (U)

(U) The search for survivable land based intercontinental ballistic missile basing concepts beyond Minuteman started in the mid-1960s, when technology pointed to the eventual vulnerability of fixed targets. It received initial emphasis when the Soviets deployed the SS-9 missile which was capable of destroying our intercontinental ballistic missile launch control centers--an act clearly indicating their intent to be capable of attacking and destroying our missile forces. Increased threats subsequently developed, centered around Soviet deployment of a new generation of accurate, multiple warhead missiles--principally the SS-18 and SS-19. In response, the United States pursued technology advances and system design studies which led to various proposals to start full

scale development of a more survivable intercontinental ballistic missile system. These efforts culminated in the decision in September 1979, to initiate full-scale development of the multiple protective shelter system.

(U) Upon taking office in 1981, President Reagan initiated a total review of the status of our strategic forces and the alternatives available to modernize the forces to meet the deterrent needs of the late 1980s and beyond. On 2 October 1981, the President announced the intercontinental ballistic missile modernization program to revitalize our strategic deterrent forces. He directed the continued development of the Peacekeeper missile (then known as M-X) with near-term deployment in hardened Titan or Minuteman silos. A long-term basing mode was to be selected in 1984. On 2 December 1981, the Senate limited efforts on hardening existing silos and called for a long-term basing recommendation by 1 July 1983. In April 1982, the Senate deferred funding for interim basing in Minuteman silos and directed a 1 December 1982 decision on a permanent basing mode. On 22 November 1982, the President announced his decision and provided direction for the deployment of 100 Peacekeeper missiles in an array of 100 closely spaced, superhardened silos located near F. E. Warren Air Force Base, Wyoming. Subsequently, the Congress decided to provide no missile production funds, to restrict obligation or expenditure of funds for full scale development of a basing mode, and to prohibit flight testing until both Houses of the Congress have approved a basing mode.

<u>Organization</u> (U)

(U) The report has been organized as follows:

- Section 1 — Need for and purpose of a modernized intercontinental ballistic missile force.
- Section 2 — Description of the current and projected Soviet threat
- Section 3 — Description of evaluation criteria and methodology
- Section 4 — Technical assessment of missile alternatives
- Section 5 — Technical assessment of basing alternatives
- Section 6 — Technical assessment of Trident II
- Section 7 — Comparative assessment of basing alternatives
- Section 8 — Modernization alternatives

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1.0 MODERNIZATION NEEDS

1.0 THE NEED FOR MODERNIZED INTERCONTINENTAL BALLISTIC MISSILES IN THE TRIAD (U

(U) Fundamental questions have been raised about the need and correct focus for the United States intercontinental ballistic missile modernization program. To address these questions in the total strategic force context, it is worthwhile to begin with a background discussion on the purpose of the United States strategic forces.

(U) United States strategic forces have been and remain the principal instrument of United States military capabilities. They are the cornerstone of our ability to achieve our most fundamental national security objective: the preservation of the United States as a free and sovereign nation. Since the Soviet Union currently poses the greatest threat to this objective, the purpose of the United States national security efforts is to deter Soviet attack on the United States and its allies; and to preclude Soviet military coercion in matters involving United States national interests. In order to support this thrust, the United States strategic forces must have perceived and actual capabilities to:

- Deny the Soviet Union any reasonable prospect of victory.
- Deter Soviet plans for warfighting with the capability for immediate, effective, retaliatory strikes.
- Control escalation in any military confrontation with the Soviet Union.

United States Nuclear Policy and Strategy (U)

(U) Ever since the end of World War II, the United States has made it clear that its nuclear capability would not be used for conquest but as a response to aggression against ourselves and our allies. This policy concedes several advantages to the attacker, including the time, place and method of attack. This policy also imposes several demanding requirements on our overall strategic forces: they must be able to survive an enemy first strike, they must be maintained in a high state of readiness; they must have assured communications with higher authorities; and they must have the flexibility to implement a variety of options that might be directed by the National Command Authority.

(U) U.S. strategic forces and employment plans are designed with sufficient flexibility to provide the capability to respond to nuclear aggression at any level. This increases the credibility of our deterrent by providing a range of viable response alternatives. This flexibility has been an important part of U.S. nuclear strategy over the past six Administrations.

(U) The United States philosophy of deterrence is founded on the premise that the Soviets must be made to believe that the cost of aggression against the United States or its allies would be too high to justify an attack. The Soviet assessment of the outcome of war must be so uncertain, dangerous, and costly, that they have no political or military incentive to initiate hostilities. To this end, it is U.S. policy to have the credible means to place at risk what the Soviets value most – their political and military command structure, strategic forces, other military forces, and industrial capabilities to support a war. At the same time, U.S. strategic forces must be viewed by the Soviets as sufficiently powerful and capable to deter Soviet nuclear coercion of the United States and/or its allies.

(U) The threat posed by the Soviet Union is ominous and growing. Those assets which are of the greatest value to the Soviets in prosecuting a war, their strategic nuclear forces and associated military leadership and control, have been substantially hardened to withstand the effects of nuclear weapons. Possessing the capability to deal with this threat places great demands on U.S. strategic forces.

(U) Finally, a fundamental goal of the United States is to reduce the risk of nuclear war. To this end, U.S. strategic forces and employment plans must be structured to allow U.S. leaders the freedom and flexibility to negotiate arms reductions with the Soviets.

The United States Strategic Force Structure (U)

(U) The United States strategic nuclear forces consist of three elements known as the strategic Triad. We have about 1000 land-based intercontinental ballistic missiles; 600 submarine-launched ballistic missiles; and 300 B-52 bombers carrying a variety of weapons.

(U) The three methods of deploying the force – land-based, sea-based, and air-based – derive from concepts formulated in the late 1950s. The considerations that led to

this structure focused on technical practicality, cost and the need for diversity in force characteristics. Diversity provides several major benefits.

- Denies the Soviet Union the opportunity to concentrate its offensive systems to exploit a common weakness.
- Presents an impossible attack problem to the Soviet Union, because the timing required for an attack on all these forces ensures warning to at least one element of the Triad.
- Ensures that adequate capability will be maintained even if one Triad element is disabled by a technical failure, or becomes vulnerable to Soviet attack.
- Increases the spectrum over which the United States can respond, thereby stressing Soviet defenses and requiring substantial Soviet expenditures for the development and deployment of defensive systems.
- Ensures against the consequences of a miscalculation concerning what most deters the Soviets, i.e., whether it is the rapid response potential of the intercontinental ballistic missile force, the enduring capability of the submarine-launched ballistic missile force, the extreme flexibility of the bomber force, or, some combination of each of these force characteristics.

[redacted]

(U) With the rapid rate of technological change, there is the likelihood of breakthroughs which could neutralize the current capability of the other two elements of the Triad. Intercontinental ballistic missiles must be strengthened to guard against such technology advances eroding the strategic deterrence of the Triad in the future.

The Unique Attributes of Intercontinental Ballistic Missiles (U)

(U) Each element of the Triad possesses unique attributes which contribute to the overall capabilities of U. S. strategic forces, and common attributes which provide the needed measure of insurance against neutralization of one or more Triad elements by the Soviets. An assessment of whether or not to modernize the intercontinental ballistic missile force should include a review of those unique attributes that intercontinental ballistic missiles now provide to the Triad.

(U) The development and deployment of intercontinental ballistic missile revolutionized the character of strategic warfare due to their unprecedented ability to compress both time and distance and to overwhelm traditional defense systems. Consequently, intercontinental ballistic missiles have been an essential element of U.S. strategic forces for over 20 years. The unique range of attributes of intercontinental ballistic missiles cannot be fully duplicated by any other single strategic system. The most important attributes are:

(U) **Countermilitary Capability** - Due to their combined accuracy, payload, and responsiveness, intercontinental ballistic missiles have the unequaled capability to place time-urgent targets at risk. This is well understood by the Soviets, since over 70% of their strategic forces are intercontinental ballistic missiles. Additionally, the Soviets have given high priority to intercontinental ballistic missile modernization, and their military thought and strategy have been heavily influenced by intercontinental ballistic missiles.

(U) **Quick Reaction Time** - The land-based intercontinental ballistic missile requires the least time to receive and react to a launch order and place a weapon on target. This capability complicates Soviet first strike planning and reduces their confidence of a successful attack. This quick reaction strengthens deterrence by:

- Providing an ability to respond before the Soviets can fully complete an attack
- Providing strategic warning to the National Command Authority by forcing the Soviets to disperse their high value assets (e.g., leadership, general purpose forces) before they initiate an attack.
- Providing the potential for launch of a U.S. retaliatory strike after Soviet submarine-launch nuclear weapons impact on certain targets in the U.S. but prior to impact of Soviet intercontinentalballistic missile warheads aimed at our intercontinental ballistic missiles, thereby creating additional uncertainty about the success of a Soviet strike.

(U) **High Alert Rate** - Intercontinental ballistic missiles have the highest alert rate of all strategic forces, and do not require force generation, which could elicit Soviet reaction, during crisis. This allows flexibility to operate other strategic force elements at lower and less costly day-to-day alert rates. The bulk of the U.S. daily alert deterrent posture is provided by intercontinental ballistic missiles (Figure 1-1).

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DAY TO DAY ALERT

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Figure 1-1. (U) Strategic Triad Contribution

(U) **Redundant Communications Links** - The intercontinental ballistic missile, with its redundant and positive two-way command and control links, provides a high degree of positive control of weapon release by the National Command Authority. Further, the ability to confirm status and rapidly retarget the intercontinental ballistic missile significantly enhances operational flexibility throughout a nuclear conflict.

(U) **Low Operating and Support Costs** - The intercontinental ballistic missile force has the lowest operating and support costs and is the least manpower-intensive strategic force element. (See Figure 1-2.)

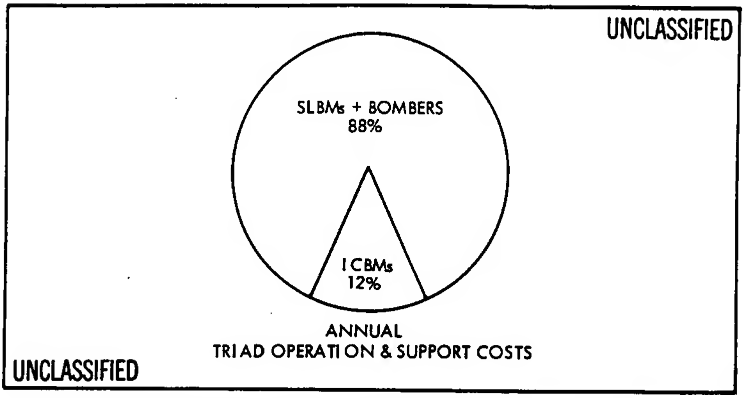

Figure 1-2. (U) Annual Triad Operation and Support Costs

The Problem: Dangerous Asymmetries in Strategic Capabilities (U)

(U) While U.S. strategic forces continue to play the key role in underscoring the credibility of U.S. deterrent capabilities, an adverse trend in the military balance over the past 15 years now dictates that immediate decisive action be taken to correct serious shortfalls in U.S. strategic force capabilities.

(U) The massive, sustained Soviet military buildup has allowed the Soviet Union to destabilize the nuclear balance with the U.S., while continuing their long-established numerical advantages in general purpose forces. Soviet heavy emphasis on strategic force modernization has provided them with a strategic nuclear force which not only has prospects for seriously challenging the ability of U.S. strategic forces to deter a Soviet preemptive strike, but also to achieve these collateral goals:

- Serve as a strategic umbrella over the air, naval and ground components of Soviet general purpose forces.
- Confirm a growing world perception of Soviet military superiority.
- Hold U.S. strategic forces at risk and pose a paralyzing "counter-deterrent" to U.S. military and political actions when confronted by Soviet actions.

(U) The current problem with the United States intercontinental ballistic missile force stems from the basic fact that the Soviet threat has outpaced U.S. modernization

- The United States must deploy intercontinental ballistic missiles with improved accuracy to correct the current U.S. strategic force inability to attack and destroy time-urgent hard targets.

- The United States must insure that its intercontinental ballistic missile forces are capable of a credible and effective retaliation.

- The United States must improve its intercontinental ballistic missile forces to provide an inherent growth potential to counter Soviet threat proliferation.

- The United States must begin to field an advanced, modernized intercontinental ballistic missile system which can provide a hedge against catastrophic failures in the current strategic force, improvements in Soviet air defenses, and advances in anti-submarine warfare.

2.0 THREAT

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2.0 SOVIET BALLISTIC MISSILE THREAT TO THE U.S. (U)

2.1 ICBM THREAT TRENDS (U)

(U) The greatest capability of the Soviets to threaten the United States is reflected in their intercontinental ballistic missile forces. The Soviets place high priorities on their efforts to improve intercontinental ballistic missiles and to protect them from attack. As a result, their ability to threaten United States strategic forces and survive a United States retaliatory strike have steadily increased over the past decade.

(S/WN) [redacted]

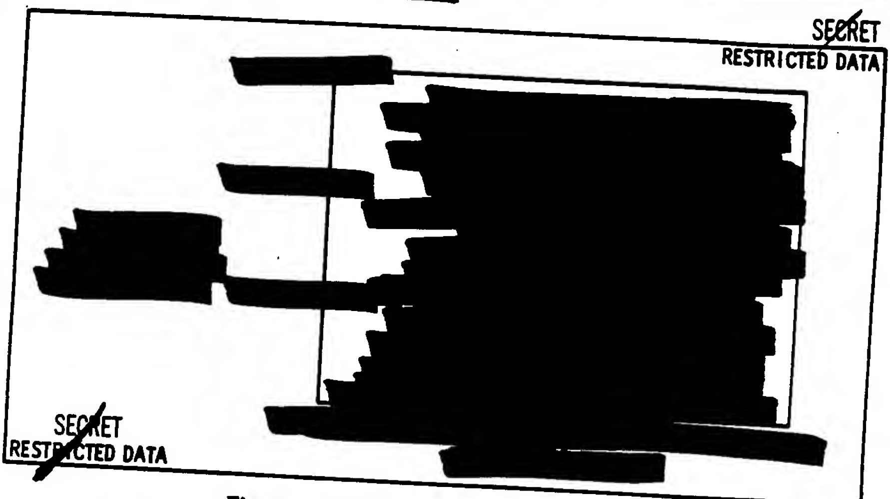

Figure 2-1. (U) Soviet Strategic Warheads

(S/WN) [redacted]

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Figure 2-2. (U) Soviet Accuracy Trends

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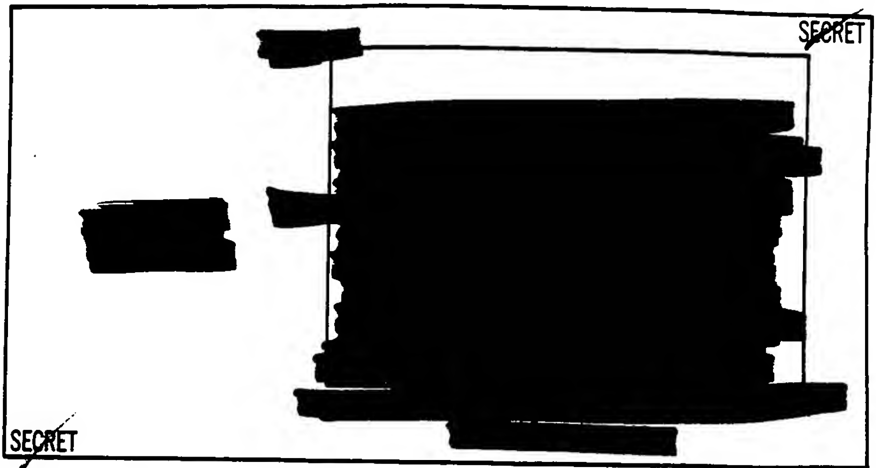

Figure 2-3. (U) Soviet ICBM Asset Hardness

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(S/~~NF~~/WN) [redacted]

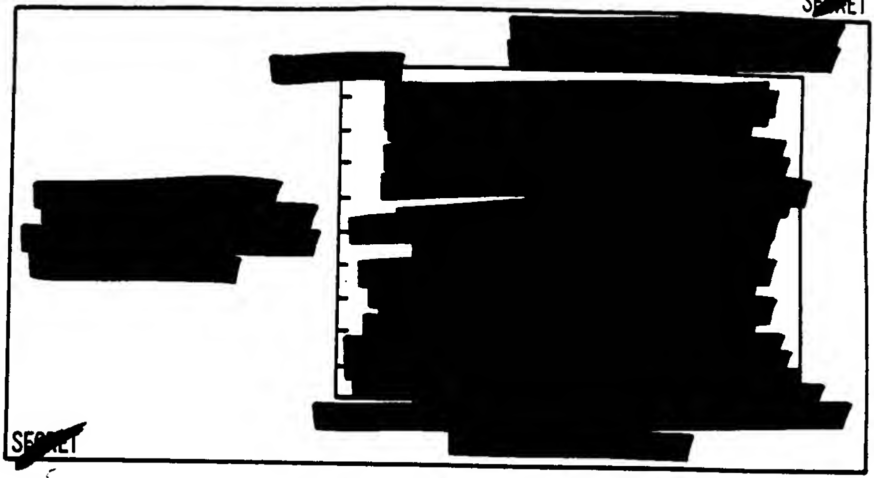


Figure 2-4. (U) Hard Targets at Risk Capability

2.2 SUBMARINE-LAUNCHED BALLISTIC MISSILE THREAT TRENDS (U)

[redacted]

(S) [redacted]

(S) [redacted]

(S) [redacted]

(S) [redacted]

[redacted]

2.3 POTENTIAL SOVIET RESPONSES TO U.S. INTERCONTINENTAL BALLISTIC MISSILE MODERNIZATION (U)

[redacted]

[redacted]

(U) The Soviets, in planning an attack against any new United States strategic system, would have to coordinate this with an attack against their other primary military

objectives — Minuteman silos, bomber bases, submarine ports, command and control, and other military targets. The more complicated such an attack plan becomes, the more difficult it would be for the Soviets to have confidence in a favorable outcome. In summary, as the complexity and risk of a possible Soviet response increases, the confidence of the Soviet planner, as well as the likelihood he will choose that option, decreases.

(U) Soviet responses and reactions to United States intercontinental ballistic missile modernization alternatives may vary according to the alternative selected by the United States. These potential responses are discussed in Section 5.2, with the specific basing alternative to which they may apply.

CRITERIA

3.0 EVALUATION CRITERIA AND METHODOLOGY (U)

3.1 EVALUATION CRITERIA (U)

(U) The FY 83 Continuing Resolution Authority specified that a technical and strategic assessment of various intercontinental ballistic missile system alternatives be conducted, as well as an assessment of the extent to which the Trident SSBN/D-5 program could be expanded in lieu of intercontinental ballistic missile modernization. The specific areas are described in the Preface to this report. National Security Decision Directive 73 also requested these assessments. Each alternative was to be assessed in terms of: military capability and deterrence value; survivability against current, projected, and responsive Soviet threats; projected cost including possible upgrades; impact on present and future arms control negotiations; strategic arms limitation treaty (IA, ABM, II) interim restraint considerations; geographic, geological, and other siting requirements; environmental impact; foreign policy considerations; and identification of possible sites for each alternative.

(U) Other areas significant to the assessment of the alternatives are: prompt hard target kill capability, the ability to provide sufficient survivability to allow adequate National Command Authority decision time, the ability to decrease the Soviet's confidence in the success of an attack, and the ability to respond to growth in the threat.

(U) To assist in the assessment of these issues, three areas of evaluation were selected. Each of these areas was further subdivided into various factors; and, subsequently, the factors divided into subfactors, at which level standards of evaluation were applied. The three areas are: strategic capability, system feasibility, and policy considerations.

3.1.1 Strategic Capability (U)

(U) This area provides the basis for the strategic assessment of the alternatives and consists of six factors:

a. **Deterrence:** The ability of an alternative to discourage coercion or nuclear attack on the United States or its allies. Deterrence is measured from the point of view of the adversary; therefore, the assessment is from a Soviet view of our

military capability. Subfactors of deterrence are: U.S. launchable weapons, Soviet attack durations, Soviet attack requirements, Soviet attack confidence, U.S. military capability including prompt hard target kill capability, and U.S. survivability from the Soviet view.

b. **Military Capability:** Measure of system capability to put Soviet hard targets at risk and be promptly launched to meet military objectives. The assessment, in contrast to deterrence, is from a United States view of capability. Subfactors include: Soviet hard targets at risk, and U.S. promptness, command, control, and communications survivability, retargeting capability, alert weapons, alert sustainability, and launch opportunities from a U.S. view.

c. **Survivability:** Measure of the system capability to survive an attack from the U.S. view.

d. **Endurance:** Measure of the system to maintain a launch capability for a protracted period in a post-attack environment for those surviving assets.

e. **Resiliency:** An assessment of the system capability to counter responsive threats. Three subfactors are: survivability against long term responsive threats, Soviet threat stress, and U.S. growth options.

f. **Defendability:** An assessment of the adaptability of ballistic missile defense, to a system alternative, to counter threat changes and/or growth. The assessment includes both potential effectiveness and deployment implications including system size, technology requirements and impact. Subfactors include: defense system contribution to deterrence, military capability, survivability, endurance, resiliency, feasibility, and arms control.

3.1.2 System Feasibility (U)

(U) This area provides the basis for the technical assessment of the alternatives and consists of seven factors. These factors are:

a. **Cost:** Weapon system costs (including development, production and military construction), operations and support costs, and the total life cycle cost (10 year). All alternatives have been costed on a consistent basis with the best available system definition and cost data. The relative confidence in the cost estimates varies with the maturity of the system definition.

b. **Schedule:** An assessment of the year of initial operational capability (10 fielded missiles), and the year of full operational capability. Two subfactors: initial operational capability schedule and full operational capability schedule are included.

c. **Technical Risk:** An assessment of the system in terms of the technical risk involved in development, production, deployment, and operation.

d. **Operability/ Supportability:** An assessment of the system requirements in terms of four subfactors: operability, maintainability, security, and logistics.

e. **Siting:** An assessment of siting opportunities in terms of the number of geographical areas that meet system requirements and a measure of flexibility of accommodating presently unforeseen constraints. Siting technical feasibility considerations are included.

f. **Environmental:** An assessment of the environmental impact of a system ranging from socioeconomic to resource impact. Six subfactors used in this assessment are: socioeconomics, biology, air quality, water resources, land use, and cultural resources.

g. **Public Interface:** A measure of the frequency of travel/movement on public roads of the nuclear warhead and/or missile during system operation.

3.1.3 Policy Considerations (U)

(U) This area is the basis for assessment of the alternatives impact on arms control and foreign policy.

- **Arms Control.** An assessment of the compliance of the system with provisions of existing strategic arms agreements (as consistent with the interim no-undercut policy) and support for U.S. objectives in future strategic arms agreements. The interim no-undercut policy, which is neither permanent nor legally binding, generally implies restraint from actions that would represent irreversible acts with respect to provisions of existing agreements. Subfactors to assess compatibility with existing agreements are: relocation or construction of additional fixed intercontinental ballistic missile launchers, and launcher modernization constraints. An assessment of an alternative's support for U.S. START objectives of militarily-significant reductions, adequate verification and leverage for successful negotiations. Six subfactors are used: system availability (leverage is highly dependent on the availability of the system; a system with a later availability provides less leverage in the current START negotiations than a system with a nearer term initial operational capability), maintenance of an active missile production

capability, force effectiveness (capability to meet mission requirements with reduced forces), near-term demonstration of a U.S. modernization program, credible prompt offensive capability that diminishes Soviet utility of large intercontinental ballistic missile forces (Soviet incentive to negotiate reductions of large intercontinental ballistic missiles), and effective verification.

- **Foreign Policy.** The impact of the alternative on perceptions of the United States foreign policy in two areas: deterrent credibility and support for NATO modernization. Support for NATO nuclear force modernization is likely to be heavily influenced by the availability of the system. A near-term deployment most likely would have greater influence on allied support for NATO nuclear force modernization than systems with later availability. Subfactors are near-term demonstration of U.S. resolve and will to modernize, perception of U.S. capability to counter the threat created by massive Soviet deployments, contribution to flexible response capability, and commitment to sovereign basing.

3.2 EVALUATION METHODOLOGY (U)

(U) Each alternative was evaluated at the subfactor level by measuring the alternative against a standard of evaluation for the subfactor. Application of the standard results in rating an alternative either outstanding good, fair, marginal, or poor for the specified subfactor. Subfactors within a factor were then combined to yield a resultant rating for the factor. These factor ratings are shown with each alternative in Section 5.2. During this evaluation, no attempt was made to weight any subfactor or factor--all were treated equally.

4.0 MISSILE ASSESSMENT

4.0 MISSILE ASSESSMENT (U)

(U) The following sections contain the detailed technical assessment of alternative missiles. On the basis of the modernization objectives stated in Section 1.0, a set of criteria was developed for use in comparison of missile alternatives. The criteria are:

- **Target Kill Potential:** The ability to attack and destroy a spectrum of targets in the Soviet Union. This ability can be measured in terms of accuracy, warhead yield, reliability, and the target coverage capability expressed as range, footprint and number of reentry vehicles.

- **Time on Target Control:** Multiple weapon detonations in a target region must be carefully sequenced to achieve desired weapon effects. The capability to sequence the attack depends on control of the time on target; a contribution to this is the missile system guidance and control, and its post boost vehicle's ability to precisely deploy reentry vehicles.

- **Hardness:** The ability of the missile to withstand the in-place and in-flight environments associated with nuclear attack scenarios.

- **Transportability:** The ability of the missile to be operated in a mobile or concealment mode.

- **Schedule and Development Status:** When the missile can be ready for initial and full deployment based upon the design maturity and test status.

(U) The four missile alternatives compared in this report are:

- **Peacekeeper.** A 195,000 pound gross weight missile which has completed initial development and is ready for flight testing.

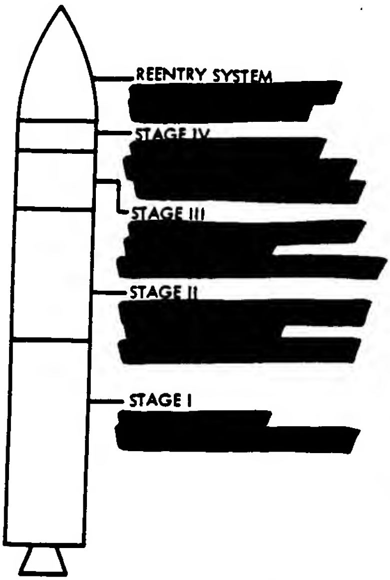
- **Common Missile.** A variant of the Navy Trident II (D-5). This variant could be ready for flight tests in late 1987.

- **Improved Minuteman III.** An enhanced version of the fully developed and fielded solid propellant missile which is the current mainstay of the land based intercontinental ballistic missile force. This version could be ready for flight tests in 1986.

- **Small Missile.** A lightweight two or three stage solid propellant intercontinental ballistic missile which is currently in advanced technology development.

(U) The following sections of this report are organized to provide a description of each missile alternative, a technical analysis of the ability to satisfy the criteria, and a summary comparison of the alternatives. Cost is not addressed in this section, since the cost per missile may not be a meaningful measure and are truly system dependent. Therefore, all costs are reflected in the basing alternatives which provide a more meaningful measure of deployed system differences.

4.1 PEACEKEEPER (U)



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DESIGN/PERFORMANCE

Total weight	[redacted]
Throw weight	[redacted]
Post boost vehicle	[redacted]
Hardness level:	
Axial	[redacted]
Lateral	[redacted]
Range	[redacted]
Footprint:	
Downrange	[redacted]
Crossrange	[redacted]
CEP	[redacted]

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Figure 4.1-1 (U) Peacekeeper Missile

DESCRIPTION (U)

(U) The Peacekeeper is a four-stage intercontinental ballistic missile that will deliver up to 10 reentry vehicles to independent targets. It is propelled from a canister by a self-contained gas generator prior to ignition of the first stage. The three booster stages employ solid propellants to provide the velocity needed to achieve intercontinental range. Stages II and III have extendible nozzle exit cones to maximize motor operating efficiencies. Stage IV uses storable hypergolic liquid propellants with a single axial thrust engine and eight attitude control engines to provide reentry vehicle spacing and deployment maneuvers. Stage IV carries the missile guidance and control set which controls the flight path and the accuracy of each reentry vehicle and initiates all launch and flight events. The reentry system consists of 10 Mark 21 reentry vehicles. Protection from nuclear dust, pebble, and thermal environments and from aerodynamic heating is

provided by a titanium shroud that covers the reentry vehicles and by external protection material over the body of the missile.

TECHNICAL STATUS (U)

(U) The majority of the testing necessary to confirm the adequacy of the Peacekeeper design to meet flight test and operational requirements has been completed. Tests have been conducted at the component, subsystem, and full scale missile levels; including functional, structural, natural and nuclear environmental, and missile integration tests.

Development Tests (U)

(U) Functional

- All subsystems tested to operational requirements
- 44 full scale propulsion stage hot fire tests
- Nine inertial measurement unit centrifuge and sled tests
- Extensive missile subscale wind tunnel tests
- Subscale staging tests

(U) Structural

- All subsystems and components tested to operational loads; i.e. static, vibration, shock
- Full scale interstage loads tests
- Integrated stage loads capability tests
- Full scale missile modal survey tests

(U) Environmental

- Materials, components, subsystems tested to natural environment extremes, i.e., temperature, pressure, humidity

(U) Nuclear

- Underground nuclear radiation tests of materials, components and subsystems
- Dust, pebble, and thermal radiation tests of external protection material

- Electromagnetic pulse and system-generated electromagnetic pulse tests of critical components
- Total missile electromagnetic pulse tests

(U) <u>Integration Testing</u>

- Fit checks of all major elements
- Full missile assembly and electrical checkout
- Missile guidance control set/propulsion integration hot fire tests

(U) Peacekeeper's design maturity and testing has progressed to the point of being ready for flight test and production start.

TECHNICAL EVALUATION (U)

Hardness (U)

(~~SRD~~) [redacted]

Accuracy (U)

(~~SRD~~) [redacted]

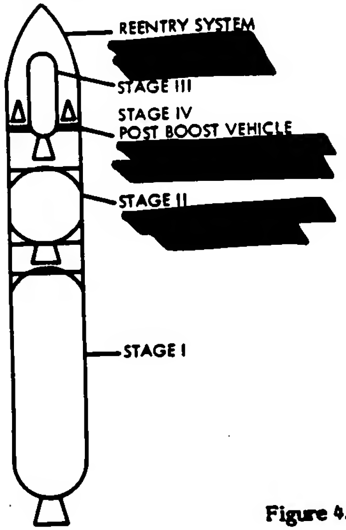
Transportability (U)

(U) Due to Peacekeeper's size and weight, large vehicles are required for movement. These vehicles are not compatible with existing public highways, which eliminated Peacekeeper from the road mobile alternative. Roads specifically designed for these types of vehicles can be constructed so that Peacekeeper can be employed in a concealment mode.

Schedule (U)

(U) Because of its development status and flight testing scheduled in 1983, an initial operational capability in late 1986 can be achieved by the Peacekeeper missile. Peacekeeper can also achieve full operational capability by 1989.

4.2 COMMON MISSILE (U)



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DESIGN/PERFORMANCE

Total weight	[redacted]
Throw weight	[redacted]
Post boost vehicle	[redacted]
Hardness level	
Axial load	[redacted]
Lateral load	[redacted]
Range	[redacted]
Footprint:	
Downrange	[redacted]
Crossrange	[redacted]
CE[redacted]	

[redacted]

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Figure 4.2-1. (U) Common Missile(s)

DESCRIPTION (U)

(U) The common missile defined in the 1978 commonality study is a four stage solid propellant, stellar-inertial guided intercontinental ballistic missile that will deliver up to six Mark 21 reentry vehicles to independent targets. It is propelled from a canister by a gas generator prior to first stage ignition. The post boost vehicle consists of a structure to house the guidance and solid propulsion systems and a platform to mount the reentry vehicles. The post boost vehicle provides the reentry vehicle spacing and deployment maneuvers.

(U) The common missile was defined to satisfy the Air Force and Navy operational system requirements. The basic dimensions, length, and diameter, were derived from submarine launcher volumetric constraints. The booster stages were sized to provide for Navy guidance access requirements at the II-III interstage and for at-sea maintenance access. The missile would fill the current Trident submarine tube. Air Force electronics hardness requirements would be adopted. The Stage I aft skirt would be compatible with

ground based canister launch. In addition, the Air Force missiles would have a dust/debris hardened shroud as well as external protective material on the booster stages. The post boost propulsion system would be the Navy's solid propellant design. Guidance would be a variant of the Navy stellar-inertial system, capable of continuous alert.

Mostly Common Missile Alternative (U)

(U) The Air Force defined a mostly common missile as an alternate to the common missile. This concept consists of the D-5 Stage I, two D-5 Stage IIs as upper stages, a liquid bipropellant Stage IV, and an advanced inertial reference sphere guidance system. This configuration would provide the Air Force with the required accuracy, target coverage, and range. In-flight electronic hardness, reentry vehicle type, command, control, and communications, and flight software could more easily be tailored to Air Force requirements without impacting the Navy's activities. The development program would delay initial operational capability approximately one year from that achievable by the Common Missile.

DEVELOPMENT STATUS (U)

(U) Since the completion of the commonality study in 1978, no further definition has occurred. As a result, the potential research and development cost savings of $1.8B presented in the 1978 study have vanished. In the 1978 study, the production costs of the additional common missiles required because of their small payload, eroded the research and development savings and resulted in a net acquisition cost savings of $300M in 1978 dollars. The Navy plans to initiate full scale development of the D-5 missile in October 1983 with Navy only requirements. The Air Force has developed the Peacekeeper through engineering design and ground testing in preparation for a flight test in early 1983. Virtually none of the Peacekeeper subsystems are applicable to the common missile because of the size difference. Initiation of a common missile development program would require an additional year to work the Air Force/Navy interfaces before development could proceed. In addition, the savings associated with a reduction of Trident I procurement because of an accelerated D-5 program, are no longer applicable.

OTHER ISSUES (U)

(U) The configuration complexities introduced by joint-service interfaces were of real concern in 1978 and remain so today. Normal management and cost effective

decisions would be delayed when interfaces with two major weapon systems are affected. Hardness, basing interfaces, and command, control, and communication interfaces are the primary concerns. The decrease in the common missile accuracy (with the stellar-inertial guidance), target coverage, and number of reentry vehicles (6 versus 10) compared to Peacekeeper all have significant impacts on the Air Force mission. Preservation of the Peacekeeper 1000 reentry vehicle force count would require 170 common missiles with attendant increased basing and life cycle costs.

TECHNICAL EVALUATION (U)

Hardness (U)

[redacted]

Accuracy (U)

[redacted]

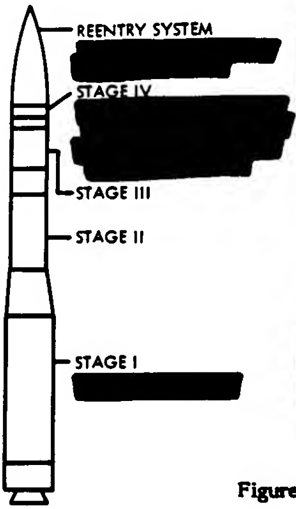
Transportability (U)

(U) Even though the common missile is smaller than Peacekeeper, it still requires large transport vehicles which exceed the public highway limits.

Schedule (U)

(U) Full scale development of the D-5 missile by the Navy is planned to begin in October 1983 with first flight in 1987. Initial operational capability for sea-based use is scheduled for December 1989. In view of the related design, development, and testing required for the common missile, the earliest feasible initial land-based deployment is 1990.

4.3 IMPROVED MINUTEMAN III (U)



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DESIGN/PERFORMANCE	
	[redacted]
Total weight (lbs)	[redacted]
Throw weight (lbs)	[redacted]
Post boost vehicle	[redacted]
Hardness level	
Axial load	[redacted]
Lateral load	[redacted]
Range (nautical miles)	[redacted]
Footprint	
Downrange (nautical miles)	[redacted]
Crossrange (nautical miles)	[redacted]
CE[redacted]	[redacted]

[redacted]

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Figure 4.3-1. (U) Improved Minuteman III

DESCRIPTION (U)

(U) The Minuteman III missile system is a four stage ballistic missile with an inertial guidance system that delivers three warheads and (if required) 16 exoatmospheric penetration aids. The first three stages use solid propellant. The fourth stage (post boost propulsion system) utilizes a liquid bipropellant system for its main axial thrust and attitude maneuvering. The guidance system is located in the post boost vehicle and provides accurate positioning data for the Mark 12A reentry vehicles. The missile is launched from its silo by igniting Stage I.

TECHNICAL STATUS (U)

(~~SFRD~~) [redacted]

[redacted]

TECHNICAL EVALUATION (U)

Hardness (U)

[redacted]

Accuracy (U)

[redacted]

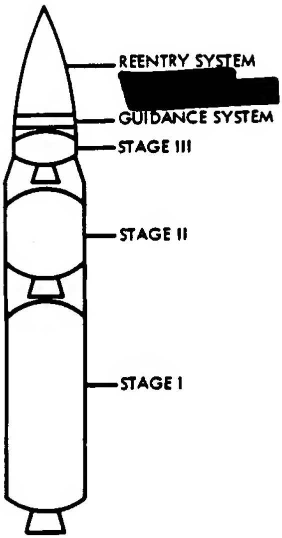
Transportability (U)

(U) The Minuteman III (less the post boost vehicle and reentry vehicles) is about 75,000 pounds and is currently transported over the highway system in the areas where it is deployed. Although it is feasible to transport the entire missile, the system was designed for alert and launch capability from a vertical position, therefore, modifications would be required for use in a mobile deployment.

Schedule (U)

(U) Missile modifications, such as the advanced inertial reference sphere, require lengthy design, development and test programs. Initial operational deployment is not feasible prior to 1988.

4.4 SMALL MISSILE (U)



DESIGN/PERFORMANCE

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Total weight	[redacted]
Throw weight	[redacted]
Post boost vehicle	[redacted]
Hardness Axial load Lateral load	[redacted]
Range	[redacted]
Footprint	[redacted]
Accuracy	[redacted]

[redacted]

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Figure 4.4-1. (U) Small Missile

DESCRIPTION (U)

(U) The small missile could have two or three solid propellant stages. The missile could be canisterized and have a cold gas launch capability. It would incorporate either a stellar-inertial guidance system for deployment in a mobile mode or advanced inertial reference sphere guidance system for a silo basing deployment. A single Mark 21 reentry vehicle would be used.

DEVELOPMENT STATUS (U)

(U) The small missile is in the study phase. It would take approximately two years before a full scale development program could be initiated. These studies seek to exploit emerging technologies, including propulsion, guidance, reentry systems, penetration aids, data processing, communications, nuclear hardening, advanced composite materials, etc. Two contractors were funded in fiscal year 1982 to perform system definition studies of

an advanced intercontinental ballistic missile for the 1990s. Advanced technologies would have to be tested and verified before missile performance in terms of weight reductions could be truly evaluated. This places some risk in deployment plans which depend on a lighter weight missile.

TECHNICAL EVALUATION (U)

Hardness (U)

(U) Since the missile is yet to be designed, the hardness levels required by the deployment concept could be designed and tested during the development program.

Accuracy (U)

(SRD) [redacted]

Transportability (U)

(U) The key attribute of a small missile would be the potential for mobile basing. It could be physically compatible with both fixed and mobile basing alternatives, and transported by truck, aircraft, or railroad.

Schedule (U)

(U) The earliest initial operational capability for the small missile is 1990. This schedule could only be achieved with the 34,000 pound missile, using a Mark 21 reentry vehicle and advanced inertial reference sphere guidance. A lighter weight missile could be achieved if lower performance in terms of accuracy and payload were to be acceptable. These lighter weight missiles (under 30,000 pounds) could not be ready for initial operational capability until several years later.

4.5 COMPARISON OF MISSILE ALTERNATIVES (U)

(U) The comparison of the missile characteristics is shown in Figure 4.5-1. The comparison of the missiles based on the criteria described above is as follows:

Military Capability (U)

(U) Peacekeeper is rated outstanding because of the ten reentry vehicles and system accuracy which provides significant hard target kill potential. The improved Minuteman III with its three reentry vehicles provides a good capability, the common missile is also rated good with its six reentry vehicles with limited hard target kill capability. The baseline small missile provides only a fair capability for hard target kill using the stellar-inertial guidance in a mobile mode. In a silo basing mode, with the advanced inertial reference sphere used, hard target kill capability would be rated good but the requirement for increased numbers of boosters for target coverage would still be applicable.

Hardness (U)

(U) The high lateral and vertical load capability gives Peacekeeper significant in-place hardness. The hardened electronics and external protection material on the booster, as well as the dust/debris hardened shroud, provide outstanding in-flight hardness. The common missile's in-place and in-flight hardness is less than Peacekeeper but still good. Improved Minuteman provides fair hardness due to its lower load capability in-place and in-flight. The small missile would be designed to achieve the hardness required and is judged to be outstanding.

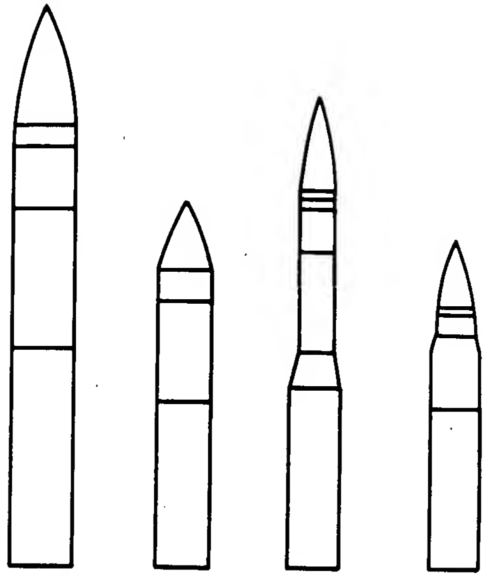
Transportability (Mobility) (U)

(U) Both Peacekeeper and common missile are marginal for mobile modes due to their large size and weights which would require special roads and vehicles. Improved Minuteman provides a fair capability with its lower weight. A good capability could be achieved with the 34,000 pound small missile, but the total gross weight of the transporter/missile would still require special vehicle permits for travel on public highways.

Schedule and Development Status (U)

(U) Peacekeeper is the only outstanding alternative to meet an early initial operational capability. Both the common missile and small missile are rated poor because they require lengthy development and test schedules. The modifications to Minuteman provide a fair schedule capability.

(U) Peacekeeper is ready for flight test and production start could be initiated since the development test and design maturity have progressed to this point. The common missile is marginal since significant development program work is required but some of the development work on Peacekeeper and D-5 would be applicable. Improved Minuteman takes advantage of the existing Minuteman system and the development work on Peacekeeper. Added work is required to design and develop the interfaces required to incorporate the modifications. Small missile has not yet had any development effort.



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	Peacekeeper	Common	Improved Minuteman	Small
Weight - pounds	[redacted]	[redacted]	[redacted]	[redacted]
Throw Weight - pounds	[redacted]	[redacted]	[redacted]	[redacted]
Length - inches	[redacted]	[redacted]	[redacted]	[redacted]
Diameter - inches	[redacted]	[redacted]	[redacted]	[redacted]
Number of reentry vehicles	[redacted]	[redacted]	[redacted]	[redacted]
Range - nautical miles	[redacted]	[redacted]	[redacted]	[redacted]
Footprint (Cross/Downrange) - nautical miles	[redacted]	[redacted]	[redacted]	[redacted]
Accuracy (CEP-feet)	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				
[redacted]			[redacted]	[redacted]

Figure 4.5-1 (U) Missile Characteristics

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5.0 BASING ASSESSMENTS

5.0 BASING ASSESSMENTS (U)

(U) One of the major intercontinental ballistic missile modernization needs is to provide sufficient survivability to allow adequate decision time for credible, effective retaliation. This section addresses various techniques to enhance survivability and is followed by technical assessments of basing alternatives.

5.1 *Basing Survivability* Techniques

5.1 BASING SURVIVABILITY TECHNIQUES (U)

[redacted]

(U) To counter the vulnerabilities in our forces due to the increasing Soviet threat, a range of basing modes to enhance survivability has been studied that use a combination of the following techniques:

- Increased hardness
- Location uncertainty
- Preferential deployment
- Defense, including active and passive concepts.

The technical considerations of each of these is addressed below.

5.1.1 Increased Hardness (U)

[redacted]

[redacted]

(U) Hardness is a measure of the ability to protect the missile and mission critical equipment from all harmful environments generated from nuclear detonations. These environments include air blast, ground shock, prompt and residual nuclear radiation, thermal pulse, electromagnetic pulse, and for near-surface bursts, cratering and the debris ejected from the crater.

[redacted]

(U) In the following paragraphs, recent advances in structural hardening to airblast will be presented, followed by discussions of key environments that the system must survive.

Structural Hardening Technology (U)

(U) Existing U.S. silos were constructed when the design philosophy was to harden the structures to prevent strains beyond the elastic limits of the materials used. This was a very conservative approach to providing protection from the relatively low overpressure environments expected from the Soviet threat at that time. Hardened silos were concrete structures reinforced with steel bars. As the Soviet threat has increased, the United States has been conducting research, testing, and analysis of hardening technology and construction techniques. Our current knowledge of structural hardening technology enables us to construct structures which can survive at 1/3 the ranges of what was thought possible 10 years ago. This knowledge results from the DNA Silo Test Program, more detailed analysis of existing data, and the application of additional hardening techniques in structure design.

(U) One technique that can be applied is the use of steel liners both inside and outside the silo and substantial amounts of reinforcing steel. Liners combined with

properly placed reinforcing steel provide confinement of the reinforced concrete and greatly enhance the concrete strength and toughness, particularly at high rates of loading. This technique has been used in the building industry where concrete is subject to near static loading. Recent experimental and analytical data for blast-type dynamic loading has led to the conclusion that concrete strength and ductility are greatly enhanced by confinement under dynamic loading. Some of this data is shown in Figure 5.1.1-1. For unconfined concrete samples ($\sigma_1 = 1; \sigma_2 = 0; \sigma_3 = 0$), the sample breaks at pressures less than 4000 pounds per square inch, with a strain of less than 0.2%. Providing confinement (σ_2 and σ_3) greatly enhances resistance to crushing. Samples tested were able to withstand pressures in excess of 15,000 pounds per square inch, and associated strains greater than 1.5%.

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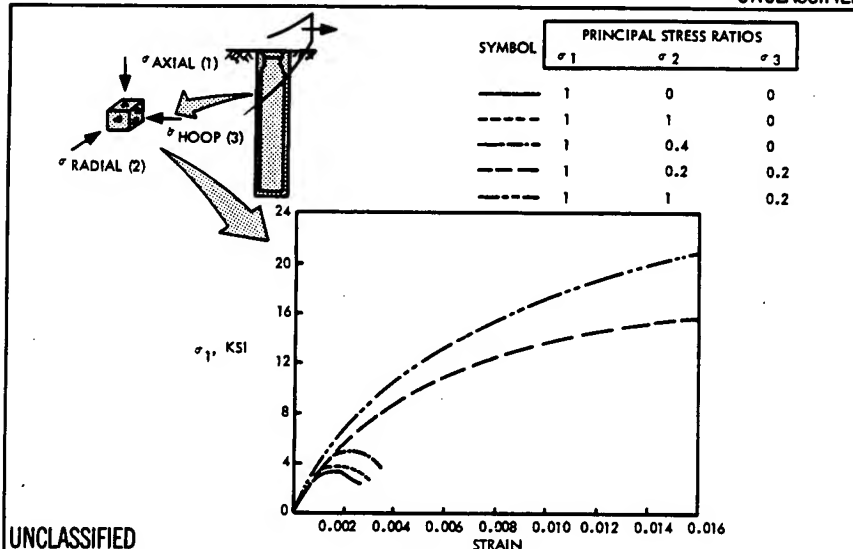

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Figure 5.1.1-1. (U) Effect of Confining Stresses on Stress-Strain Properties of Concrete

(U) In addition, significant advances have made in defining failure strain in structures subject to airblast loading. Data from tests of scale model cylinders in the Vertical Silo Test and Dynamic End On Test programs conducted in 1979 are presented in Figure

5.1.1-2. These tests showed that properly designed structures can absorb airblast loadings which produce strains substantially above the elastic limit without failure. Also shown are results on three structures, VS1.5A, VS1.5C, and VS1.5A retest, which are similar to the current Peacekeeper baseline recently tested in the Defense Nuclear Agency's Silo Test Program.

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[redacted]

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Figure 5.1.1-2. (U) Subscale Structural Test Data Concrete With Liner

[redacted]

[redacted]

(S) [redacted]

Table 5.1.1-1 (U) Silo Test Program Summary

SECRET

Event (No. Structure)	Environment Overpressure/ Yield (Scale)	Results
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

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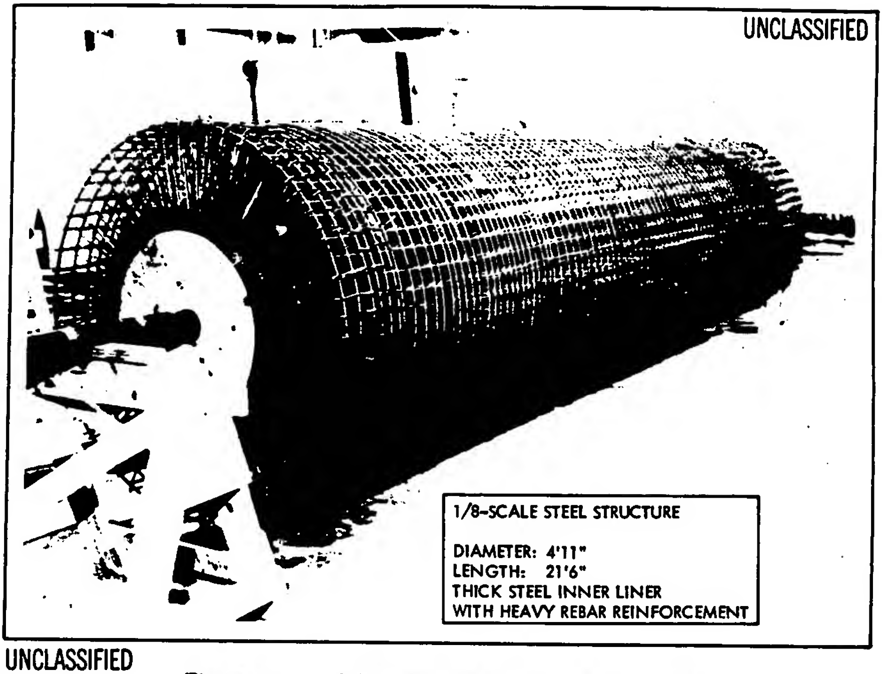
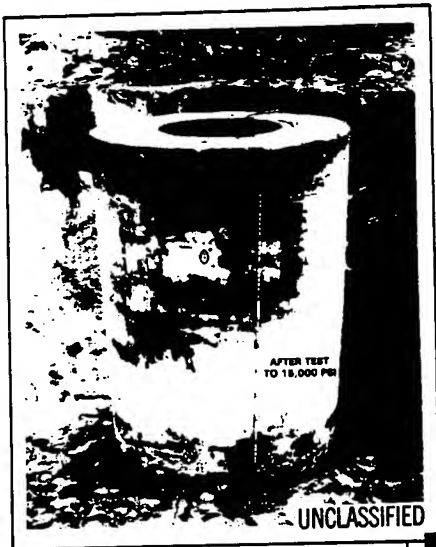


Figure 5.1.1-3. (U) Generic Superhard Test Structure

Airblast (U)

(U) The prospects of superhard silo survival at much closer ranges from a weapon detonation has required reexamination of the airblast environment predictions at these ranges. Previous calculations in the high overpressure region (above 10,000 pounds per square inch) were motivated by a theoretical interest or were accomplished to provide initial conditions to ground shock, cratering, thermal, or far-field airblast analyses. Thus, they were less detailed than required for structural response calculations or for estimating range to potentially lethal airblast environments. Accordingly, Defense Nuclear Agency has reexamined airblast predictions in the high overpressure region, with attention not only to peak overpressure but also to the impulse (pressure times time) delivered by the airblast wave. Since the superhard silos are more ductile, they are less sensitive to the peak overpressure than to the impulse delivered to the structure.



AFTER TEST TO 15,000 PSI

VS 1.5A

Figure 5.1.1-4. (U) November 1982 Hardness Post Test Results

(U) Results of more refined calculations in the high overpressure region indicate a less stringent environment for superhard silos than the older, coarser approximations. While the peak overpressure may be higher at a given range than previously predicted, the airblast waves are of shorter duration and thus contain less impulse than previously predicted.

Cratering (U)

(U) As silos become increasingly resistant to the blast environments, they are able to survive at distances approximating the crater radius resulting from the detonation of multi-megaton weapons. Cratering ejecta is a problem for missile egress, and the proximity of a surviving silo to the crater has required an examination of crater prediction techniques. Previous estimates were based on the summation of crater radius data from a variety of dissimilar geologies, and included data from both high explosive and nuclear weapons testing.

(U) The Pacific nuclear cratering data is the basis for prediction of wet soil nuclear craters. A correction term, based on high explosive data, has been used to predict craters for other geologies. Analysis of the Pacific data shows the cratering efficiency (crater volume per unit of weapon yield) to be independent of yield and crater shapes to be shallow and broad, or dish-shaped.

(U) Recent scaled crater simulations using a small, high explosive charge in a high-acceleration centrifuge have shown that cratering efficiency is dependent on yield, at least for dry soil. Furthermore, the crater shapes predicted for dry soil are more bowl-shaped than dish-shaped. While there is some uncertainty in the energy equivalence between the high explosive and nuclear loading, the importance of gravitational effects for nuclear yields above one kiloton is strongly suggested. This implication was consistent with results of surface burst cratering calculations. These calculations had been considered questionable because of their inconsistency with the Pacific based crater predictions, but now this basis for crater predictions has received more scrutiny. and is currently the best estimate for dry soil geologies.

(U) The question arises as to why the Pacific craters do not follow the trends obtained from the calculations and scaling of centrifuge test results. One explanation has

been tied to the unique character of the Pacific geology, which was wet coral. Based on analysis of a high explosive test, it was hypothesized that a substantial portion of the nuclear crater formation resulted from the fracturing and collapse of the coral structure. Analysis of some of the craters using a very simplified strength model of the coral shows this phenomena to be consistent with a large volume flat-bottomed crater. Even though the Pacific tests provide the only megaton yield cratering data, the data would not be directly relevant to the cratering process expected for dry soil sites in the Continental United States.

(U) The dry soil cratering predictions used in recent calculations for silo siting are based on the kiloton size nuclear testing at the Nevada Test Site. These devices produced a surface burst cratering efficiency of about 150 cubic feet per ton. To obtain predictions at higher yields the following scaling corrections were made: the cratering efficiency was reduced by a factor of three to account for modern weapons having much more energy in radiation than the special test devices used in the Nevada test; and the cratering efficiency was reduced with increasing yield to account for gravitational scaling effects obtained from centrifuge tests.

[redacted]

Ground Shock (U)

(U) The response of the missile and its shock isolation system is most sensitive to the vertical motions caused by the airblast loading and to horizontal motions caused by direct- and upstream-airblast-induced effects.

(U) Prediction of upstream-induced peak horizontal velocity is based on analysis of high explosive data and on use of a factor of two energy equivalence between high

explosive and nuclear explosives. Prediction of peak horizontal displacement has been based on crater volume scaling: viz., $d_H = 0.45\ V^{4/3}/R^3$, where V is the apparent crater volume and R is the range.

(U) Surface burst continuum code calculations results were not used previously because they had not shown good agreement with the high explosive data and had no demonstrated validity. The most severe limitation of the calculations was in the ability to characterize the in situ material properties. Laboratory testing of ground materials results in vastly different answers, compared to in situ behavior, if, for example, there is a very small loss of water from a test sample of saturated material. This and other problems were addressed in developing improved properties for the 100-ton MIDDLE GUST III high explosive test. When the recalculation of this test resulted in reasonable agreement with the data, the use of such calculations was considered.

Superhard Silo System (U)

(U) The current superhard silo system, designed to survive combined nuclear weapons effects at ranges close to the weapon detonation point, is shown in Figure 5.1.1-5. It includes the features of structural hardening described previously. In addition, it provides substantial vertical and horizontal rattlespace combined with a shock isolation system, to preclude missile damage during severe ground motion. Shown in Figure 5.1.1-6 is the missile egress sequence which must cope with problems of lifting the closure through debris from nearby craters. While not shown, the system is designed to provide shielding against other nuclear weapons effects including electromagnetic pulse and radiation environments.

(U) Since hardness at distances close to nuclear detonations requires survival from combined effects, it is not useful to describe hardness only in terms of the traditional designator of overpressure level. One must now designate hardness in terms of "range to effects." This "range to effects" is defined as the distance from ground zero at which a specified level of damage will occur with 50% likelihood.

(S) [redacted]

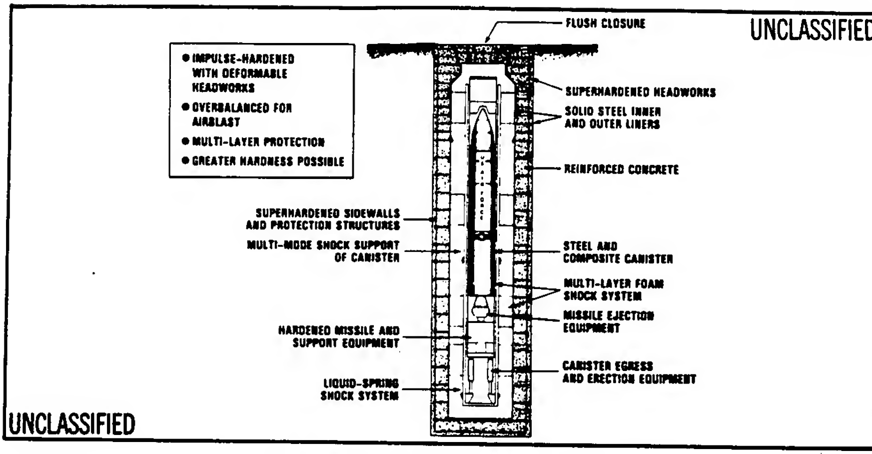


Figure 5.1.1-5 (U) Superhard Silo

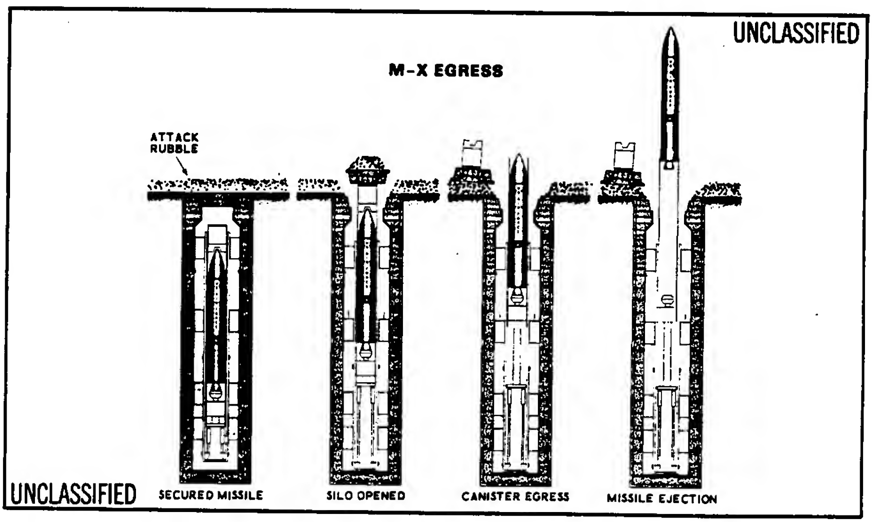


Figure 5.1.1-6 (U) Egress Sequence

[redacted]

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Table 5.1.1-2. (U) Range to Effects for Superhard Silos

Yield (MT)	Range (feet)			
	(U.S. View) Surface Burst	(U.S. View) Airburst	(Soviet View) Surface Burst	(Soviet View) Airburst
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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5.1.2 Location Uncertainty (U)

(U) Prelaunch survivability can be enhanced through the concept of location uncertainty. The two basic methods of creating location uncertainty are: construction of many more shelters than reentry vehicles; and continuously moving the missile over a large area in time periods less than the Soviet intelligence and retargeting time cycle.

(U) For the first method to be successful, four prerequisites must be met. First, the United States must assess the number of warheads the Soviets have available and then deploy a sufficient number of shelters which counters this threat to achieve the desired level of survivability. Second, the system must be able to conceal placement of the

missile in a shelter. Third, once the missile is concealed, this concealment must be maintained over time. And fourth, the system must be expandable to counter threat growth.

[redacted]

(U) Current technology allows confidence in the ability to transport and to conceal emplacement of a missile in a shelter. Maintenance of concealment over time depends on the system's ability to have all shelters and any signatures emanating from them to appear indistinguishable whether occupied by a missile or not. The technology required to identify the key signatures that differentiate an occupied shelter from others, and develop a simulator to replicate the signature or a countermeasure to mask the signature, has been developed. Detection and prevention of Soviet intelligence efforts to gather signature data and defeat the simulations is important to the system's survivability.

(U) A positive feature of systems which successfully use location uncertainty for survivability is that the Soviets must, if they choose to attack, expend many more weapons than they can destroy. This adverse exchange ratio, if large enough, enhances deterrence.

(U) The second method of creating location uncertainty is deployment of a system which is mobile. Many types of mobile intercontinental ballistic missile systems have been proposed over the years. Included among them are rail, road, off-road, and air mobile systems. The survivability of rail and road mobile systems is based on the requirement for the Soviets to attack large portions of either the U.S. rail lines or road network. Off-road concepts envision deploying literally anywhere in the U.S. The missile transporters would need to have the capability to travel over natural terrain rather than the rail or road network.

(U) All of these modes could also be used in a stationary configuration. The stationary configuration, which relies on changing location once an attack is started, depends on early warning and the hardness and speed of the transporting vehicle. Road and rail systems are limited to land vehicle speeds and they are limited in hardness capability. Air-mobile strip alert systems can achieve higher speeds, but their hardness is lower than the land mobile systems.

5.1.3 Preferential Deployment Location (U)

(U) The survivability of land based intercontinental ballistic missiles may be enhanced by choosing a preferential location for missile deployment. The parameters that are most important are: geology, topography, and depth of burial. By careful selection of appropriate sites an attack can either be made more difficult, resulting in reduced effectiveness, or potentially negated. The following discussion amplifies on how these parameters contribute to enhanced survivability.

(U) The survivability of intercontinental ballistic missiles is improved by the geology in which deployment occurs. Rock tends to transmit stresses with little attenuation. Water-saturated soil also tends to transmit stresses with small amounts of attenuation. Dry soil tends to significantly attenuate stresses so that reduced stress levels are transmitted to the structure.

(U) Topography can be made to play a key role in intercontinental ballistic missile survivability. The reentry angles for attacking intercontinental ballistic missile weapons are relatively shallow. Since attacks are expected to come primarily from the north, locating intercontinental ballistic missile shelters on the south side of high terrain requires the attacker to change his reentry angle. The attacker would have to loft his attack to avoid the top of the terrain, or would have to over-fly the target, inducing greater offsets. Lofting to higher angles to avoid the terrain reduces accuracy and range, or requires off-loading of payload to achieve the range. Maneuvering reentry vehicles, which could solve this problem by "tucking" over the terrain, require the development of new technologies.

(U) Increasing the depth of burial of the structure housing the missile can also improve survivability. The ultimate use of this technique is deep basing. This deployment

places thousands of feet of earth between a detonating weapon and its intended target. To attack a deep underground deployment requires large numbers of very large-yield weapons to transmit sufficient energy into the ground to damage the buried intercontinental ballistic missile.

5.1.4 Defense (U)

(U) The concepts discussed so far achieve survivability for intercontinental ballistic missiles through design measures; achieving hardness that an attacker cannot overcome, creating location uncertainty, or reducing weapons effects of attacking weapons through preferential deployment. Survivability, however, can also be achieved through an active approach where attacking weapons are destroyed or deflected from their intended targets by defensive weapons systems. A detailed discussion of defense concepts is included in Section 5.3.

5.2 BASING ALTERNATIVES (U)

Introduction (U)

(U) Four separate intercontinental ballistic missiles and nine basing approaches are considered in this report. The basing approaches considered are:

Closely Spaced Basing: Missiles deployed in vertical superhardened silos spaced approximately 2000 feet apart.

Closely Spaced Basing With Concealment: Missiles deployed as in closely spaced basing, with 300 silos. These silos may be located in multiple modules. The missile location is concealed through system design and operational procedures.

Widely Spaced Basing: Missiles deployed in vertical superhardened silos spaced a few miles apart.

South Side Basing: Missiles deployed in superhardened silos on the south side of mesas.

Multiple Protective Shelters: Missiles deployed in 4600 horizontal shelters of relatively low hardness spaced approximately one mile apart.

Road Mobile - Soft: Missiles deployed on mobile launchers which travel continuously on public roads.

Road Mobile - Hard: Missiles deployed on hardened mobile launchers which are garrisoned or mobile on military reservations.

Deep Basing: Missiles deployed underground at sufficient depths to provide high survival to nuclear attack.

Existing Minuteman Silos: Missiles deployed in existing Minuteman silos with no silo hardness enhancements.

(U) The basing alternatives considered in the assessment were derived by considering the results of the missile comparisons of Section 4.0, previous program configurations or specific requests. This results in eleven baseline alternatives which are shown in Table 5.2-1 and discussed in the following sections. Missile excursions to the baseline alternatives are also shown, these are discussed in the applicable sections.

(U) Nearly all of the system alternatives were sized with a number of missiles that can carry approximately 1000 warheads. Peacekeeper baselines call for 100 missiles with 10 warheads each; the 1000 small missiles each carry a single warhead, and the 350 Minuteman III missiles each carry three warheads for a total of 1050, giving roughly

equivalent numbers of warheads. Similarly, 170 common missiles with six warheads each would total 1020 warheads. The multiple protective shelters alternative is an exception. It considers 200 Peacekeeper missiles in 4600 shelters, to be consistent with the directed program of three years ago. The 1000 warhead standard permits equitable comparisons among alternatives.

Table 5.2-1. (U) Baseline System Alternatives

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Basing Mode	Missile**			
	Peacekeeper	Common	Improved Minuteman III	Small
Closely Spaced	100/100	170/170*	350/350*	1000/1000
Closely Spaced With Concealment	100/300	170/300*	350/1050*	---
Widely Spaced	100/100	170/170*	350/350*	---
South Side	100/100	170/170*	350/350*	---
Multiple Protective Shelters	200/4600	---	---	---
Road Mobile - Soft	---	---	350/350*	1000
Road Mobile - Hard	---	---	350/350*	1000
Deep Basing	100	---	---	1000*
Existing Minuteman Silos	100/100	170/170*	350/350	---

* Excursions from baseline alternatives

** Number of missiles/number of structures

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(U) For each of the baseline system alternatives, the following sections are organized to provide a concept overview, description, technical assessment, and evaluation. Where applicable, the missile excursions from the baseline alternative are discussed.

ASSUMPTIONS FOR SYSTEM EVALUATION (U)

(U) A comparative assessment of the eleven baseline system alternatives has been performed using the criteria and methodology defined in Section 3.0. The Soviet attack objectives, threat assumptions used in the evaluation, and an explanation of the performance evaluation format follows.

Soviet Attack Objectives (U)

[redacted]

SECRET

[redacted]

SECRET

Figure 5.2-1. (U) Attack Timelines

[redacted]

[redacted]

[redacted]

[redacted]

(U) The evaluations of the alternatives give consideration to these objectives and how they affect Soviet attack confidence for each system.

Threat Assumptions for System Evaluation (U)

(U) Each basing alternative was evaluated against several threat conditions:

[redacted]

Current Soviet Threat Capability (U)

(S/WN) [redacted]

SECRET
RESTRICTED DATA

Number of Boosters	Payload		
	Number of Reentry Vehicles/ Boosters	Yield (megatons per RV)	Circular Error Probable (feet)
[redacted]	[redacted]	[redacted]	[redacted]

SECRET
RESTRICTED DATA

Projected Threat Excursion (1989) (U)

(S/NF/WN/FRD) [redacted]

- (U) The number of SS-18 boosters is 308. This is the current Soviet inventory and the assets the Soviets would likely target against a new U.S. intercontinental ballistic missile.
- (S) [redacted]
- (U) Any reentry vehicle could be used by any booster subject to actual booster capability. These potential reentry vehicles include:

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Reentry Vehicle Yield (megaton)	Reentry Vehicles per SS-18 Boosters
[redacted]	[redacted]

SECRET

- (U) The above assumptions for this responsive threat excursion are intended to provide an indication of a stressing Soviet threat capability against U.S. system alternatives. This stressing threat is not outside the bounds of a possible Soviet response to the deployment of any system; but is not the national intelligence estimate projected threat; nor is it necessarily the most likely Soviet response. For the purpose of this analysis, this threat provides a reasonable way to compare alternatives and ultimately provide design conservative conditions to show requirement for force size.

Long Term Responsive Threat Excursion (U)

(U) This threat excursion is based upon the same assumptions as the 1989 projected threat excursion except it uses the improved accuracies predicted for mature Soviet reentry vehicles in the early 1990's. This threat is used to evaluate system resiliency to potential Soviet responses without a United States counter. Since the United States would be capable of observing Soviet system development in sufficient time for the U.S. to respond with a growth counter, the evaluation of resiliency also includes available U.S. counters.

Reactive Threat Options (U)

(U) These threats are possible high technology special purpose weapons which the Soviets might consider developing in reaction to a specific United States basing alternative. They are discussed in the assessment of the resiliency of each basing alternatives.

EXPLANATION OF PERFORMANCE EVALUATION (U)

ATTACK SCENARIO (U)

(S/WN) [redacted]

- (U) Threat is constrained to the SS-18 as the booster of interest for comparative analysis—fixed inventory at NIE level.
- [redacted]
- (U) Weapons are constrained only by the types (yields) shown previously and deployed with the above accuracy ranges.
- (U) Each evaluation uses the SS-18, as defined, mates a weapon from the weapon mix that provides best Soviet capability, and fixes U.S. survivability at 10%.

(U) Performance is assessed from both a Soviet and a United States point of view. The Soviet view, attack conservative, requires severe damage to missile launchers, and uses conservative estimates of the nuclear generated environments. The general result is a heavier, lengthier attack structure. The U.S. view, launchability, recognizes survivors at the light damage level.

(U) For the closely spaced, superhard silo basing alternatives, several attack scenarios are presented. These illustrate the dilemma of the Soviets in conducting an attack which attempts to achieve all the attack objectives, promptness, completeness, and low risk.

STRATEGIC CAPABILITY (U)

DETERRENCE: (U)

ATTACK PRICE (10% SURVIVORS)

UNCLASSIFIED

(U) This graph displays the estimated Soviet attack price to attack the system in both the U.S. view (light damage) and the Soviet view (severe damage). Results are shown for the current Soviet threat capability and the projected threat excursions. The analysis shows total SS-18 equivalent boosters needed and is not constrained by current Soviet booster resources.

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ATTACK DURATION (10% SURVIVORS)

UNCLASSIFIED

(U) This graph displays the Soviet attack time in the U.S. and Soviet view. Generally, the longer the attack duration, the less desirable from the Soviet view.

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MILITARY CAPABILITY: (U) Military capability is a composite measure of the U.S. systems' ability to put Soviet hard targets at risk and to be promptly executed should deterrence fail. In the U.S. view, the number of Soviet hard targets placed at risk by the weapon system is defined as the number of U.S. weapons deployed, adjusted for reliability and damage expectancy.

SURVIVABILITY: (U) Survivability results are discussed in terms of U.S. survivors after a first wave of Soviet attack using the current Soviet threat capability and for stressing attack scenarios derived from the projected Soviet threat capability. Ratings for survivability are:

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	Survivors After First Wave of Soviet Attack (Percent)
Outstanding	50
Good	35-49
Fair	20-34
Marginal	11-19
Poor	10

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U.S. SURVIVORS
(Up to 308 SS-18 Equivalents Applied) (U)

UNCLASSIFIED

(U) This graph displays the number of surviving weapons in the U.S. and Soviet view for the current and excursion threats. Survivors are displayed for two separate conditions: Those remaining at the end of the first wave of a multiwave attack and available to fly out in a retaliatory strike; and those remaining at the end of the application of the existing Soviet SS-18 force, assuming no U.S. flyout.

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ENDURANCE: (U) A measure of the system to maintain launch capability of surviving assets for a protracted period after a Soviet first strike.

RESILIENCY: (U) An indicator of the system capability to counter responsive and reactive Soviet threats. Subfactors include the degree to which the system stresses Soviet technology and availability or potential of U.S. growth option to counter responsive and reactive threats and survivability against long term responsive threats.

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Reactive Threat Description	Time Frame	Potential Response
(U) This table presents potential Soviet reactive threats which might be considered by a Soviet planner and developed as specific responses to a given basing alternative. The earliest possible IOC for these responses are indicated, along with U.S. options for countering these threats.		

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DEFENDABILITY: (U) An assessment of the adaptability of Ballistic Missile Defense to the system, both treaty constrained and unconstrained. The evaluation considers the effect of defense on all factors assessed in the basing evaluations.

SYSTEM FEASIBILITY (U)

COST: (U) Estimated Weapon System costs in FY 82 dollars shown for the following categories:

- R&D
- Production
- Military Construction
- Total Acquisition Cost
- 10 Year O&S Cost
- Total Life Cycle Cost (10 years)

SCHEDULE: (U) An estimate of the year of the systems' initial operational capability (IOC) and full operational capability (FOC). Schedule ratings are:

	IOC Year	FOC Year
Outstanding	1986	1989
Good	1987	1990
Fair	1988	1991
Marginal	1989	1992
Poor	1990 and beyond	1993 and beyond

IOC Schedule Constraints (U)

(U) An identification of the schedule constraints which pace the system IOC.

TECHNICAL RISK: (U) An assessment of the technical risk involved in development, production, deployment, and operation.

OPERABILITY/SUPPORTABILITY: (U) An assessment of the ability to operate and support the deployed system.

SITING: (U) An assessment of the availability of suitable sites for the system. The factor considers the number of geographical alternatives meeting system requirements, an assessment of constructibility and the degree of confidence in each location.

ENVIRONMENT: (U) An assessment of the potential environmental impacts of a system based on the subfactors described in Section 3.0.

PUBLIC INTERFACE: (U) A measure of the frequency of travel/movement on public roads of the nuclear warhead and/or missile during deployment and operation of the weapon system.

POLICY (U)

ARMS CONTROL: (U) An assessment of system compatibility with existing arms control agreements and proposed arms reduction objectives. Subfactors include compliance with existing agreements, verification, leverage, and strategic arms reduction compatibility.

FOREIGN POLICY: (U) An assessment of the implications of the alternatives on U.S. foreign policy based on the impact in two areas: U.S. deterrent credibility, and support for NATO modernization.

SUMMARY (U)

POSITIVE FEATURES: (U)

NEGATIVE FEATURES: (U)

5.2.1 Closely Spaced Basing
in Superhard Silos

5.2.1 CLOSELY SPACED BASING IN SUPERHARDENED SILOS (U)

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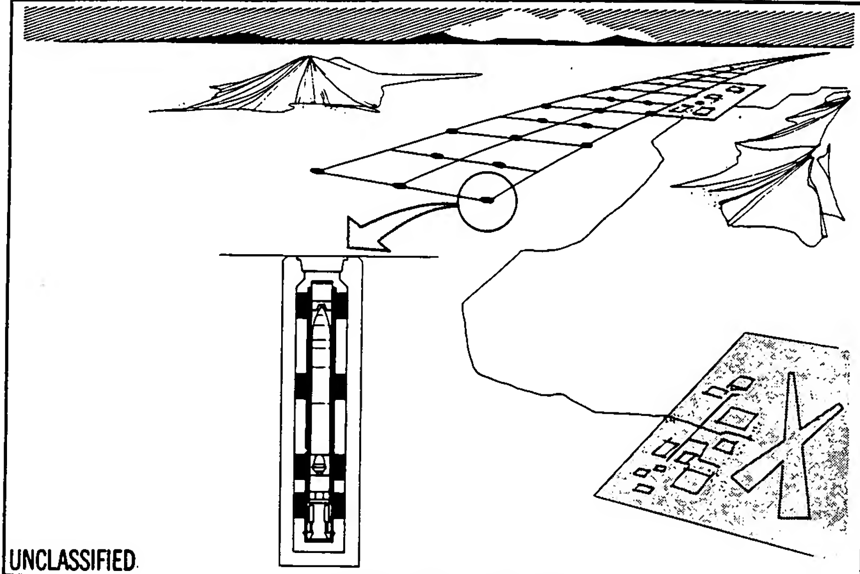

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(U) SIGNIFICANT FEATURES

- 100 Peacekeeper missiles
- 100 superhard silos
- 2000 foot spacing
- Two hardened launch control centers
- Small deployment area
- F. E. Warren Air Force Base, Wyoming, is proposed operating base

5.2.1.1 Concept (U)

(U) Closely Spaced Basing uses two interrelated factors to provide missile survivability. First, the missiles are protected in superhard vertical silos. Second, this protection is enhanced by close spacing which degrades attack effectiveness due to attack-induced effects, which either disable or deflect incoming weapons, rendering them ineffective. As a result, the Soviet attack options would be constrained to complex, timing-critical, high-risk attacks. Such attacks must be sequenced in successive waves over several hours, permitting flyout of surviving missiles between waves.

5.2.1.2 Description (U)

(S) [redacted]

(U) The canisterized missile and operational support equipment are moved by a special transporter/emplacer. This vehicle carries the loaded canister from the missile assembly area to the site and emplaces it vertically in the silo.

(U) The missile is shock isolated both vertically and horizontally. The silo hardness is provided by reinforced concrete walls over 6 feet thick with steel liners and a concrete and steel closure atop the silo approximately 8 feet thick. A buried facility adjacent to the silo contains the support equipment needed for environmental control and electric power preattack.

(U) Two hardened, manned launch control centers maintain command and control of the missiles through fiber optics cables and hardened high- and low-frequency radio networks during trans- and post-attack. Besides the hardened launch control centers, ground-mobile and airborne launch control centers also provide command and control.

(U) Physical security involves security personnel and area surveillance. The deployment area would be fenced and restricted from public use. Each silo would have intrusion detection sensors similar to those used in the Minuteman weapon system.

5.2.1.3 Technical Assessment (U)

a. (U) Survivability

(S) [redacted]

[redacted]

(U) With superhardening, the spacing between silos can be as close as 2000 feet and not result in multiple kills by a single weapon. Since large yield, accurate weapons are required against the superhard silos, and since detonations occur in close proximity, the nuclear effects from earlier detonations are of sufficient intensity to jeopardize other nearby incoming weapons. This phenomenon is called fratricide. The key aspect of fratricide is that it limits the attack rate against closely spaced superhard silos. Soviet attack strategies which strive for quick execution are denied by fratricide effects. Other attack strategies are constrained by fratricide and must be structured to minimize these effects or accept high penalties and risks. The following discussion explains fratricide effects in greater detail.

(U) The nuclear effects in the atmosphere following a nuclear detonation include prompt radiation, electromagnetic pulse, fireball, blast, ejecta, dust, and debris. Prompt effects are radiation, blast, fireball, and ejecta. These effects immediately follow a nuclear detonation and dissipate after a few tens of seconds. Delayed effects are the dust and debris clouds that rise to high altitudes and persist for hours.

Prompt Effects (U)

[redacted]

[redacted]

[redacted]

(S) [redacted]

(S) [redacted]

Delayed Effects (U)

(S) [redacted]

(U) Figure 5.2.1-1 illustrates how the various fratricide environments would effect reentry vehicles.

(S) [redacted]

[redacted]

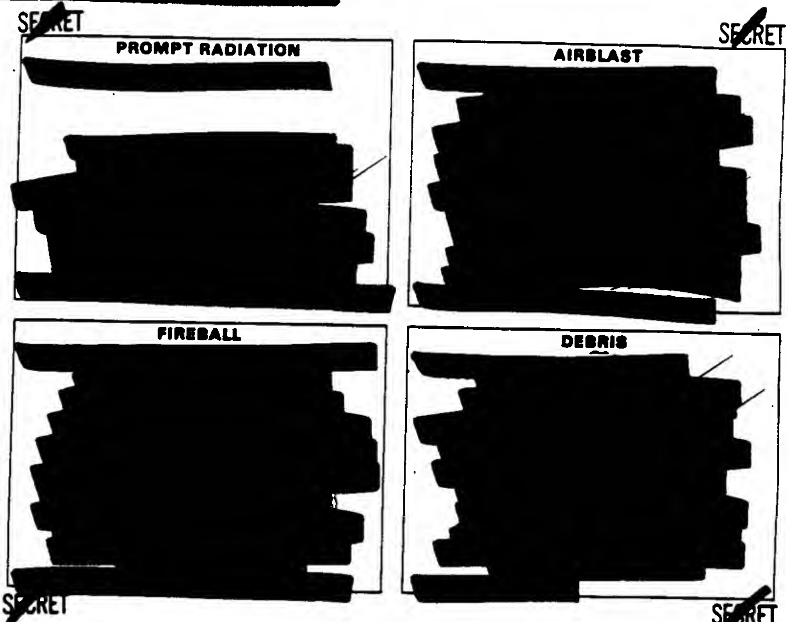

Figure 5.2.1-1. (U) Fratricide Environments and Their Affects on Attacking Reentry Vehicles

b. Attack Scenarios (U)

[redacted]

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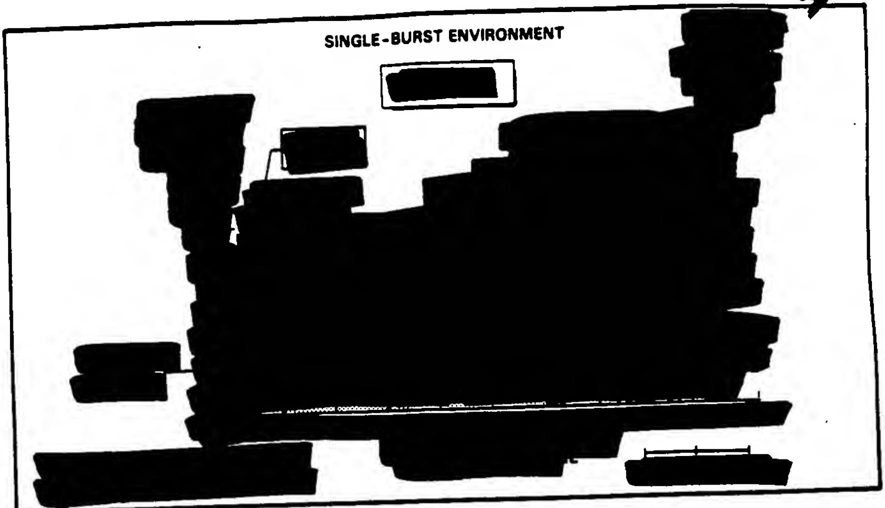

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Figure 5.2.1-2. (U) Six Megaton Airburst Fratricide Effects

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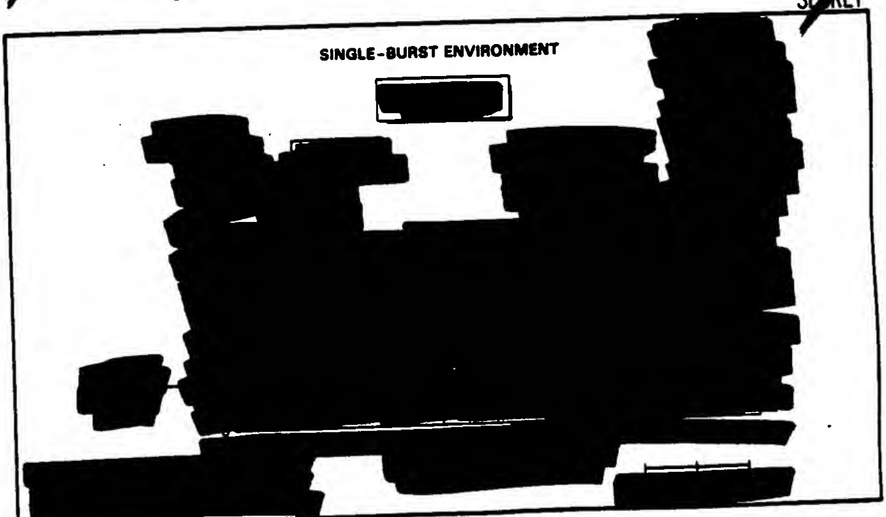

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Figure 5.2.1-3. (U) Six Megaton Groundburst Fratricide Effects

[redacted]

(U) The alternatives are short duration attacks. These ignore fratricide effects or accept the penalties and have high risk because of fratricide uncertainties or low kill rate. Additional attack waves and Soviet booster resources are required. Consequently, no single attack on closely spaced basing will meet all Soviet attack objectives.

(U) There are two general attack types which could be used against closely spaced basing: a spike attack and a walk attack (Figures 5.2.1-4 and 5.2.1-5). In a spike attack, all of the silos are attacked simultaneously. In a walk attack, silos are attacked one-by-one, row-by-row. As shown in Figure 5.2.1-5, the southernmost silos (row 1) are attacked first, one at a time, followed by an attack on the silos on row 2. If successive silos were to be attacked about every 2 to 4 seconds, this would be referred to as a fast walk attack. If the silos were to be attacked every 30 seconds or longer, this would be a slow walk. Silos at the south end of the closely spaced basing deployment area would be attacked first to avoid flying over previous detonations.

(U) In either the spike or walk attack, airbursts or groundbursts could be used. A groundburst would be used to couple a significant amount of the weapon's energy directly into the ground in order to destroy the silo with ground shock or cratering. A large amount of ejecta, dust, and debris would result. An airburst would attempt to destroy a silo with airblast. Additionally an airblast minimizes crater formation and the amount of ejecta.

(U) A spike attack would be used to try to kill as many silos as possible in a single wave attack (Figures 5.2.1-2 and 5.2.1-3). This attack would have important drawbacks for the Soviets. The missile system accuracy, operational timing uncertainties, and control of the booster burn combine to distribute all of the weapons at various heights above their intended targets at any instant in time. Analysis indicates that roughly 80% to 90% of the attacking weapons could be destroyed by radiation or blast from nearby exploding weapons.

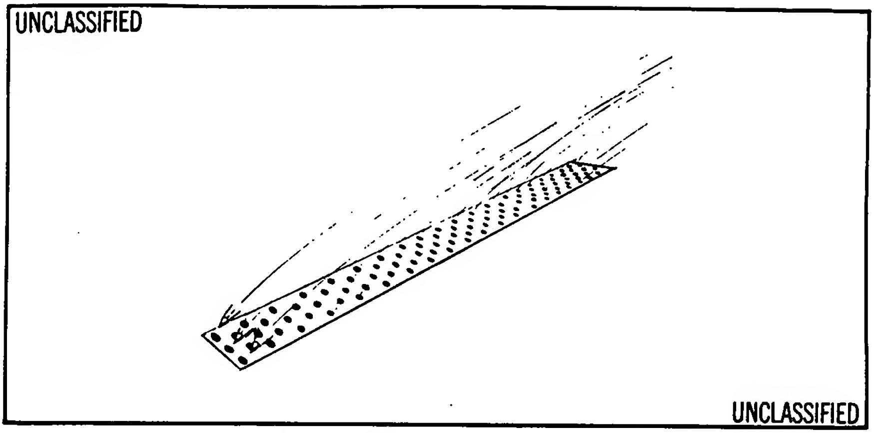


Figure 5.2.1-4. (U) Spike Attack

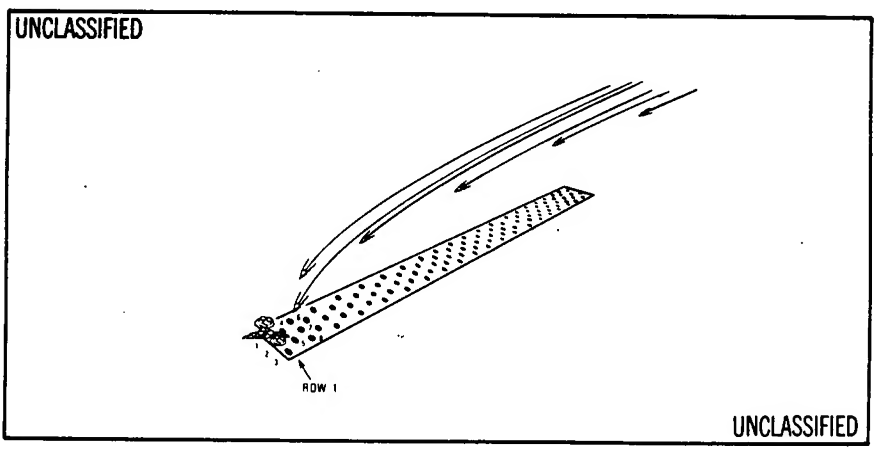


Figure 5.2.1-5. (U) Walk Attack

(U) On the other hand, the Soviets could choose to avoid fratricide totally. The Soviets could use a very slow walk attack and burst weapons at the rate of one an hour or longer. This attack would attempt to avoid fratricide effects altogether by waiting for the dust and debris to clear. This attack would be the least likely option because of the extremely long time it takes to complete, and it allows a potential for surviving United States missiles to be launched before additional warheads arrive.

(S) [redacted]

[redacted]

[redacted]

(S) [redacted]

Figure 5.2.1-6. (U) Illustration of a 6 Megaton Fast Walk Groundburst Attack

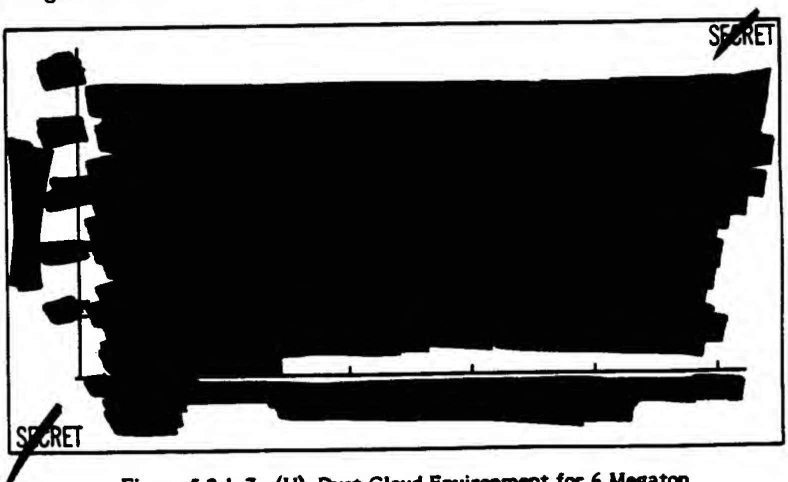


Figure 5.2.1-7. (U) Dust Cloud Environment for 6 Megaton Slow Airburst Walk Attack

[redacted]

(S) [redacted]

(U) In the attack types cited above, each silo in the array would be targeted. To avoid fratricide effects completely, the attacker may target only part of the array and a limited number of silos, wait for the dust and debris to settle, and then attack a different set of silos. These attacks are known as partial spike and walk attacks. A partial spike is an attack on only part of the closely spaced basing array (e.g., every fourth silo). In this way the enemy would attempt to space individual weapon detonations far enough apart to avoid prompt fratricide effects. Several waves of partial spikes would be needed to complete a full attack, and since a partial spike attack could only be directed at a fraction of the closely spaced basing force at one time, a higher number of Peacekeeper missiles would not be attacked and could be launched in retaliation.

(S) [redacted]

(U) To prevent this flyout, the Soviets might resort to the tactic of pindown. Pindown of intercontinental ballistic missiles is the creation of a lethal environment in the predicted intercontinental ballistic missile flyout corridors. This environment can be created either above the atmosphere (exoatmospheric) or in the atmosphere (endoatmospheric). The exoatmospheric kill mechanism would be x-rays and the endoatmospheric kill mechanism would be airblast. For the pindown to be effective, it would need to be maintained long enough to allow direct attacks and reattacks on the intercontinental ballistic missiles before they could fly out. The rate of detonations depends on how well the missiles to be pinned are hardened.

(S) [redacted]

(S) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

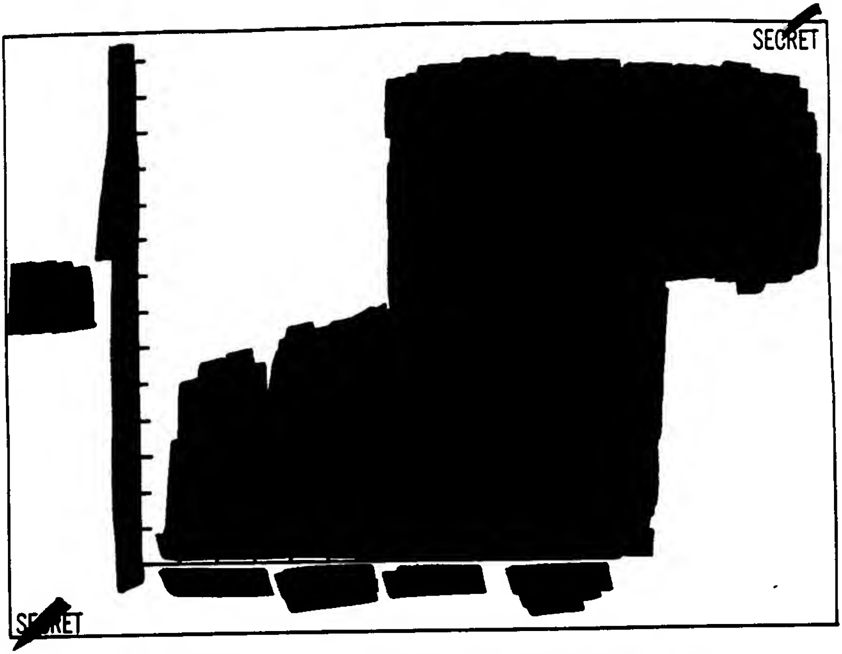


Figure 5.2.1-8. (U) Comparative Costs for Soviet Preattack Pindown of Closely Spaced Basing

Soviet Attack Scenarios for Performance Assessments - Projected Threat Excursion (U)

(S) [redacted]

- [redacted]

[redacted]

• (S) [redacted]

• (S) [redacted]

(U) Table 5.2.1-1 shows the results against these three attack scenarios with both the U.S. and Soviet view shown.

Table 5.2.1-1. (U) Closely Spaced Basing 100/100 Performance Against Projected Threat Excursion (1989) (Assumes Full U.S. Rideout)

SECRET

ATTACK	YIELD/CEP	FIRST WAVE SURVIVORS (%)		SURVIVORS TO SS-18 EXH (%)		#WAVES TO 10% P_S		TOTAL ATTACK PRICE (SS-18 EQUIV)		TOTAL ATTACK DURATION (HRS)	
	(MT/FT)	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	

SECRET

~~(S)~~ [redacted]

~~(S)~~ [redacted]

~~(S)~~ [redacted]

~~(S)~~ [redacted]

~~(S)~~ [redacted]

[redacted]

(U) All three of the representative attacks are complex, highly structured attacks requiring precise timing and pindown tactics for a reasonable amount of success. None of the attacks satisfy all of the Soviet attack objectives, with the best scenario only achieving one objective – complete coverage.

(S) [redacted]

c. **Resiliency to Threat Enhancement (U)**

(S) [redacted]

[redacted]

Table 5.2.1-2. (U) Closely Spaced Basing 100/100 Performance Against Long Term Responsive Threats (Assumes Full U.S. Rideout)

SECRET

ATTACK	YIELD/ CEP	FIRST WAVE SURVIVORS(%)		SURVIVORS TO SS-18 EXH(%)		# WAVES TO 10% P_S		TOTAL ATTACK PRICE (SS-18 EQUIV)		TOTAL ATTACK DURATION (HRS)	
	(MT/FT)*	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

SECRET

(U) Closely spaced basing is particularly well suited for an effective treaty-limited defense. This is largely due to the relatively narrow attack corridor and the Soviet requirement to conduct highly structured attacks.

(S) [redacted]

[redacted]

~~(S)~~ [redacted]

Figure 5.2.1-9. (U) Effect of Additional Closely Spaced Basing Superhard Silos With Concealment in Countering Soviet Responsive Threats

Reactive Threat Options (U)

~~(S)~~ [redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]

(U) Closely spaced basing is designed to be capable of being enhanced to counter these exotic weapons developments to remain survivable.

[redacted]

[redacted]

[redacted]

[redacted]

(S) [redacted]

(S) [redacted]

Countermeasures (U)

(S) [redacted]

(U) The closely spaced basing deployment of 100 Peacekeeper missiles in 100 closely spaced superhard silos does not require immediate growth. Since a Soviet response to closely spaced basing could take several diverse paths, closely spaced basing is specifically designed to allow a variety of growth options. The closely spaced basing design, deployment, command and control system, and siting considerations are being conducted to permit and facilitate additional silos and/or ballistic missile defense deployment, if necessary. Consequently, the deterrent value of closely spaced basing could be maintained over time.

(S/N) [redacted]

[redacted]

Cost to Soviets (U)

(U) Closely spaced basing stresses Soviet technology. Major gains in Soviet accuracy, fuzing, or exotic reentry vehicle capabilities are required to negate the system with the high confidence the Soviets would likely desire. Such gains require a major investment in resources. Should the Soviets be successful in their development efforts, the United States can counter with effective growth options and countermeasures which retain survivability and will offset whatever gains they may achieve. Consequently, closely spaced basing 100/100 is considered outstanding in resiliency to responsive threats.

d. Siting/Environment/Public Interests (U)

(U) Primary siting considerations include: depth to rock and water, terrain, minimum parcel size, coastline and national border standoff distances, population avoidance, significant environmental and cultural feature avoidance, and proximity to a suitable support base. Areas near F. E. Warren Air Force Base, Wyoming, have been proposed as the deployment area for closely spaced basing.

(U) Partial field verification work has been conducted in Wyoming which provides confidence in the geotechnical feasibility.

(U) Deployment around Cheyenne, Wyoming requires approximately 13,500 acres of new land that would be fenced and permanently removed from public access. Approximately 600 acres will be permanently disturbed due to silos, roads, and new operational and support facilities. Operations and maintenance requires about 2300 people with peak year employment expected to reach 6100 during the construction period. In-migration of construction, operations, support personnel and their families will result in increased demand for land, housing, and public services. Limited environmental impacts on all resources will occur due to increased activity in the area.

(U) Current land use in the deployment area is moderately intensive agriculture on private land, in an area of high rural population density. Mitigations can be developed to compensate for and/or control indirect impacts.

(U) Public interest issues could include the need to acquire private land and to prohibit public access to the deployment area, the effects of population growth and competition for groundwater.

e. Technical Issues/Risk (U)

(U) Three major issues have been raised on closely spacing basing:

- Feasibility of superhard silos and validation of the hardness.
- Validation of fratricide effects.
- The ability of the Peacekeeper missiles to be launched during the interwave periods.

(U) Each of these issues was addressed in the preceding discussions (Section 5.1 and 5.2.1.3). In the hardness area, the state-of-the-art technology in structural, mechanical, radiation, and electromagnetic pulse hardening enables us to design the system to accommodate the blast, shock, debris, thermal, radiation, and electromagnetic pulse environments at ranges very close to ground zero. The validation of these hardened designs has been planned and will be carried out in the scheduled test and analysis program during the full scale development phase.

[redacted]

(U) A closely spaced basing system introduces a new factor into the problem of defining the range and extent of the fratricide environments--multibursts totaling trillions of tons of TNT equivalent in a confined area. Since these fratricide environments cannot be generated in a test, the analytical modeling and simulation of these environments has been a subject of considerable discussion. In the summer of 1981, key scientists

and engineers from weapons laboratories, the Air Force, the ballistic missile defense and Defense Nuclear Agency communities convened to address the fratricide issue and concluded that fratricide effects would substantially complicate a Soviet attack. However, considerable uncertainty of the fratricide issue exists which neither the United States nor the Soviets will be able to resolve without aboveground nuclear tests. Defense Nuclear Agency and the national laboratories are continuing to study the phenomena by simulation methods (test and computer analysis) and underground tests to address the uncertainties.

(U) The overall technical risk of closely spaced basing, and all other superhardened options, is a function of continuing superhardening technology validation.

f. Arms Control (U)

(U) If SALT I or II were in effect at the time of deployment, they would prohibit the construction of additional fixed intercontinental ballistic missile launchers or the relocation of existing silos. Closely spaced basing could be perceived by some not to be consistent with SALT because it employs protective silos to house the deployed missiles and the canister-launchers are not moved on a regular and frequent basis. However, closely spaced basing is consistent with these SALT prohibitions because it does not entail the deployment of fixed launchers. Unlike conventional intercontinental ballistic missile silos, the closely spaced basing silo is not the launcher. It serves only to support the Peacekeeper missile and protect it from attack. The launcher is the non-fixed missile canister which is transportable and contains all the equipment necessary to launch the missile.

(U) Closely spaced basing is compatible with United States objectives in the current START negotiations. Closely spaced basing gives the United States the modern, effective, and flexible force that must be emphasized as weapon inventories are reduced; thus, it complements the United States position in START calling for significant reductions. The Peacekeeper missile in closely spaced basing provides significant negotiating leverage in the START talks by providing a demonstration of U.S. resolve to modernize and counter Soviet capability that threatens U.S. strategic forces; thus diminishing the utility of Soviet large intercontinental ballistic missile forces. Closely spaced basing poses few verification problems because of the large missile, protective silos, and well defined deployment area.

5.2.1.4 Missile Excursions (U)

a. Common Missile (170/170) (U)

(U) The common missile excursion is sized at 170 missiles to provide an equivalent number of reentry vehicles as 100 Peacekeeper missiles. Detailed common missile characteristics and performance capabilities are described in Section 4.2.

(U) The common missile, weighing about two-thirds that of Peacekeeper, requires a somewhat smaller transport vehicle (support equipment transported with the missile are the same as Peacekeeper). Other system elements are essentially the same. The vertical silo has the same diameter, the same closure and silo support equipment; the shock isolation and egress systems are about the same as Peacekeeper. The launch control system equipment is identical. The acquisition cost of the common missile system is $3.0B more than Peacekeeper due to the cost of 70 additional silos and the associated support equipment.

(U) Initial operational capability of the common missile system, with in-silo and in-flight hardness equivalent to Peacekeeper is estimated to be 1990, four years later than Peacekeeper. The decision window is closed in terms of fielding a modernized common missile intercontinental ballistic missile force in the mid-1980s.

b. Improved Minuteman III (350/350) (U)

(S) [redacted]

(U) The vertical silo length is approximately the same as for Peacekeeper. Mechanical support systems (egress and shock isolation) will be similar as will electrical support systems with the exception of Minuteman peculiar interfaces.

[redacted]

(U) An initial operational capability of 1988 is paced by the improvements to the missile.

c. **Small Missile (U)**

(U) This is treated as an alternative in Section 5.2.3.

5.2.1.5 Summary (U)

(U) An initial deployment of 100 Peacekeeper missiles in superhard silos in a closely spaced configuration provides good deterrence because of the significant improvement in U.S. military capability. Extensive analysis of a broad spectrum of attacking weapon capabilities and tactics culminate in two important conclusions: destruction of one superhard silo in a direct attack requires the expenditure of at least one SS-18 with the accuracies projected for this decade, and rapid and certain destruction of closely spaced superhard silos is nearly impossible with currently available Soviet systems. When pindown considerations are taken into account, analysis indicates that approximately three SS-18s would be required to destroy each Peacekeeper.

(U) Leverage against advanced threats could be achieved by using one of the available growth options or countermeasures. The use of a growth option with closely spaced basing would substantially raise the price of an attack to such a level that the post-attack strategic balance cannot be viewed favorably by the Soviets during the 1990s.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

- (S) [redacted]
- (S) [redacted]
- (S) [redacted]

(S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

SECRET

- (U) **Missile Excursions:**

  - Common Missile - Good. Due to the increased number of silos deployed (170), the attack price would be 1.7 times higher than the Peacekeeper baseline, assuming the same in-place hardness is achieved. However, with decreased guidance accuracy, it has less hard target capability.

  - Improved Minuteman III - Outstanding. Due to the increased number of silos deployed (350), the attack price would be 3.5 times higher than the Peacekeeper baseline, assuming the same in-place hardness is achieved. Hard target capability is the same as the Peacekeeper baseline.

ATTACK PRICE (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) INCLUDES PINDOWN WEAPONS (U)

SECRET

[redacted]

SECRET

ATTACK DURATION (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

MILITARY CAPABILITY: (S) [redacted]

- (U) **Missile Excursions:**

  - Common Missile - Fair. With decreased guidance accuracy, fewer (about 400) time-urgent hard targets at risk.

SECRET

- Improved Minuteman III - Outstanding. Provides the same capability as the Peacekeeper baseline.

SURVIVABILITY: (S) [redacted]

(S) [redacted]

- **(U) Missile Excursions:** Outstanding. Soviet attack scenarios are more complicated due to the increased number of silos.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
***(ASSUMES FULL U.S. RIDEOUT) (U)**

SECRET

[redacted]

SECRET

ENDURANCE: (S) [redacted]

- **(U) Missile Excursions:** Good. Equivalent capability can be incorporated into either missile excursion.

RESILIENCY: (S) [redacted]

- **(U) Missile Excursions:** Outstanding. The growth capability is independent of missile used, with the exception of differences in initial deployment size.

SECRET

Reactive Threat Description	Time Frame*	Potential Response
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		

SECRET

DEFENDABILITY: (U) Outstanding. This basing alternative is compatible with treaty limited fixed base defense. Ballistic missile defense increases the attack duration and pindown attack price to deny intercontinental ballistic missile trans-attack flyout.

- **(U) Missile Excursions:** Outstanding. The defendability of the Common Missile or the improved Minuteman III missile in the closely spaced basing mode is essentially the same as Peacekeeper. Some defense configuration changes would accommodate the increased array(s) size; 170/170 for Common and 350/350 for improved Minuteman III.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

	Peacekeeper	Common	Improved Minuteman III
R&D	9.7	9.7	7.5
Production	13.5	15.2	21.0
Military Construction	3.2	4.5	10.2
Total Acquisition*	26.4	29.4	38.7
O&S	2.9	3.2	3.8
Total Life Cycle	29.3	32.6	42.5

* Includes contingency for potential hardness uncertainty, command, control and communications, and sensor system integration.

SCHEDULE (U)

	Peacekeeper	Common	Improved Minuteman III
Rating	Outstanding	Poor	Fair
IOC	1986	1990	1988
FOC	1989	1993	1991

IOC Schedule Constraints (U)

(U) Peacekeeper and Improved Minuteman

- Congressional restriction on facility design is tied to Congressional review of this technical assessment and completion of the environmental impact analysis process
- The environmental impact analysis process completion is scheduled for November 1983
- Land acquisition can not begin before environmental impact analysis process completion
- Land availability by April 1984

(U) Common Missile and Improved Minuteman III

- Missile development is the primary constraint for each excursion.

TECHNICAL RISK: (U) Good. No pacing technology issues exist, however, validation tests are required to verify silo hardness.

- **(U) Missile Excursions:**
  - Common Missile - Fair. The risk is associated with meeting the Air Force hardness requirements, both in-place and in-flight, without compromising Navy requirements for submarine use.
  - Improved Minuteman III - Good. No pacing technology issues exist, however, validation tests are required to verify silo hardness.

OPERABILITY/SUPPORTABILITY: (U) Good. The system is readily operable and supportable with a moderate manpower investment. Maintenance/logistics procedures are well defined. The compact, enclosed deployment area is easily accessible and compatible with area security requirements.

- **(U) Missile Excursions:** Good. Increases in manpower would be required to support the additional missiles deployed over a large area.

SITING: (U) Outstanding. One operating base required. There are suitable sites near F. E. Warren Air Force Base. Four other potential areas exist which support alternate site layouts.

- **(U) Missile Excursions:**
  - Common Missile - Outstanding. The 170 silos do not significantly change the availability of suitable sites.
  - Improved Minuteman III - Good. The 350 silos would be capable of being sited near F. E. Warren AFB, but use a significant portion of suitable area.

ENVIRONMENT: (U) Good. The expected population in-migration, the level of construction activity and the attendant demands on existing resources at F. E. Warren Air Force Base should result in limited impacts which can be resolved with conventional mitigations.

- **(U) Missile Excursions:**
  - Common Missile - Good. However, impacts on land use and biological resorces would be greater due to the larger deployment area. Socio-economic impacts would also be somewhat greater due to increased manpower requirements.

- Improved Minuteman III - Fair. Additional silos and land area would result in comparatively larger impacts.

PUBLIC INTERFACE: (U) Outstanding. The weapon system is controlled within a secure fenced area. There is no public exposure to the weapon system.

- **(U) Missile Excursions:**
  - Common Missile - Outstanding. Essentially the same as Peacekeeper, although there would be more silos in the deployment module.
  - Improved Minuteman III - Fair. One area support center would support two arrays for this missile excursion. This results in the missile, mated with the warhead, being transported on newly constructed roads to which public access would be possible.

POLICY (U)

ARMS CONTROL: (U) Outstanding. Closely spaced basing would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. The system is verifiable using present techniques. The system provides good leverage for arms control discussions and supports the objective of significant reductions.

- **(U) Missile Excursions:**
  - Common Missile - Good. The 1990 IOC provides reduced leverage for current negotiations.
  - Improved Minuteman III - Good. Does not provide as much leverage for negotiations as Peacekeeper.

FOREIGN POLICY: (U) Outstanding. Deployment will enhance U.S. military capability required for deterrence and will add to the perception of U.S. resolve to redress the current strategic imbalance. Closely spaced basing deployment, by demonstrating U.S. political will to strengthen the land based element of the Triad, will help sustain and strengthen key allied government support for NATO nuclear force modernization.

- **(U) Missile Excursions:**
  - Common Missile - Good. Later IOC (in 1990) could cause this alternative to have a reduced effect on sustaining and strengthening allied support for NATO nuclear force modernization.

- Improved Minuteman III - Good. Possibility that this alternative may not be perceived as a serious attempt to redress the strategic imbalance.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

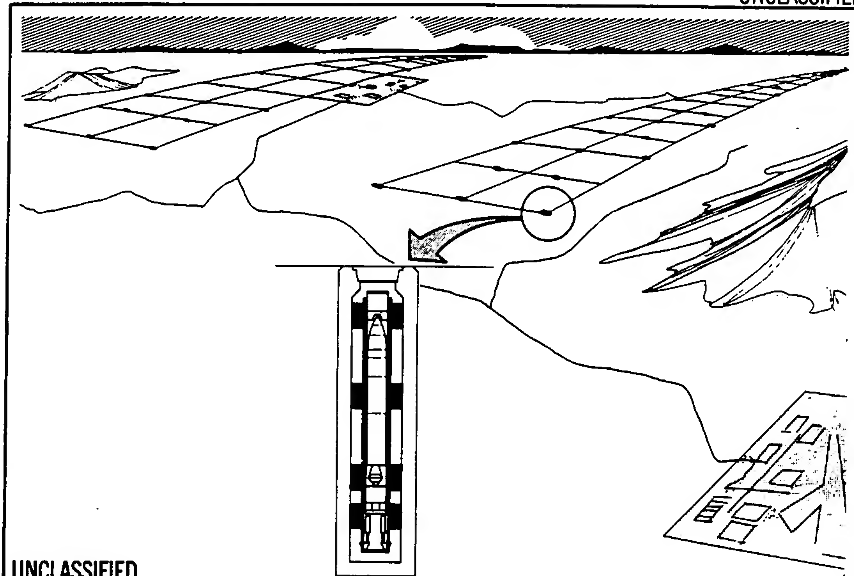
- Prompt strike capability against hard targets
- High effectiveness against currently projected NIE threats
- High Soviet price to negate system
- Low attack confidence
- Near term availability IOC - 1986
- Resilient and defendable
- Small deployment area
- Requires the Soviets to replace "small" MIRVs with larger RVs, thus decreasing Soviet warhead inventory and targeting flexibility
- Could be well defended by Antiballistic Missile Treaty compliant defense
- Throw weight flexibility for penaids or large yield reentry vehicles

NEGATIVE FEATURES: (U)

- Technical validation not final

5.2.2 CLOSELY SPACED BASING WITH CONCEALMENT (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 100 Peacekeeper missiles
- 300 superhard vertical silos
- Two 150-silo arrays
- 2000 foot spacing
- Two hardened launch control centers per array
- Concealment at 3:1 silo-to-launcher ratio
- Area physical security

5.2.2.1 Concept (U)

(U) This concept combines the features of closely spaced basing with a concealment concept similar to that of multiple protective shelters. Although it requires more land area than closely spaced basing, the land requirements are substantially less than those of multiple protective shelters.

(U) The 100 transportable operational support equipment units, consisting of the Peacekeeper missile and its support equipment, are randomly concealed in 100 of 300 superhard vertical silos. The remaining 200 silos have simulators that provide characteristics similar to those of the missile. The silos form two north-south arrays of 150 each. Survivability is achieved by protecting the missile in a superhard silo enhanced by close spacing, which degrades attack effectiveness. Concealment, hardness, and close spacing of the silos contribute to system survivability.

5.2.2.2 Description (U)

(U) Deployment is similar to that of closely spaced basing, except that the missiles are in two separate arrays rather than one. Some additional facilities are required to assemble and maintain the simulators and allow a missile/simulator exchange capability before transport to a silo. At the exchange facility, the transporter/emplacer vehicle can insert or remove missiles or simulators. A capacity sufficient to permit mixing of the two types is incorporated in the exchange facility.

(U) Four hardened, manned launch control centers maintain preattack command and control of the missiles through fiber optics cables and rely on hardened high and low-frequency radio networks in trans-attack and post-attack environments. Besides the hardened launch control centers, ground mobile and airborne launch control centers can provide command and control.

(U) The deployment area will be fenced and restricted from public use. Each silo will have intrusion detection sensors. Since concealment affects survivability, security is emphasized. Facilities particularly sensitive with respect to concealment, such as the central exchange facility, are preferentially protected.

5.2.2.3 Technical Assessment (U)

(U) This section presents a technical discussion of the salient features and critical issues for superhard silos with concealment.

a. Survivability (U)

(U) Closely spaced basing uses superhardened silos and siting geometry (close spacing, array shape, etc.) and concealment to increase survivability. The discussion of Section 5.2.1.3 also applies. However, as the accuracy of Soviet weapons continues to

improve, further hardening of the silos may no longer be practical from the cost effectiveness viewpoint. Adding more silos would be more effective in providing the necessary leverage to increase the Soviet attack price and number of U.S. survivors.

(S) [redacted]

Table 5.2.2-1. (U) CSB 100/300 with Concealment – Performance Against Projected Threat Excursion (1989) (Assumes Full U.S. Rideout)

SECRET

ATTACK	YIELD/CEP	FIRST WAVE SURVIVORS(%)		SURVIVORS TO SS-18 EXH(%)		# WAVES TO 10% P_s		TOTAL ATTACK PRICE (SS-18 EQUIV)		TOTAL ATTACK DURATION (HRS)	
	(MT/FT)	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	

SECRET

(U) The issues of trans-attack and post-attack flyout of the Peacekeeper missile during and between attack waves and the Soviet tactic of pindown to prevent flyout were also discussed in Section 5.2.1.3b. These issues are similar to the ones of closely spaced basing, but the larger area required for two arrays makes pindown two to three times as difficult and costly a tactic for the Soviets to execute.

(U) From the viewpoint of Soviet attack objectives, the projected attacks against closely spaced basing with concealment require the application of significantly more direct attack and pindown weapons over longer intervals than for closely spaced basing with 100 silos. Assuming the Soviets would have sufficient booster resources for such attacks, the objectives of promptness and low risk are still not satisfied. Prompt, low risk attacks on closely spaced basing with concealment are not plausible when considered from the viewpoint of projected Soviet capability.

(U) Consequently this alternative is considered outstanding in survivability for projected threat excursions.

b. Attack Scenarios (U)

(U) The attack strategies the Soviets could use against closely spaced basing with concealment are similar to those which would be used against closely spaced basing. These were described in Section 5.2.1.3b. The attacks against closely spaced basing with concealment, however, require significantly more booster resources and longer durations due to the additional silos.

c. Resiliency to Threat Enhancement (U)

(U) The responsive threats for closely spaced basing also apply with concealment and are discussed in Section 5.2.1.3.c. The addition of concealment to the system, however, would extract nearly three times the attack price of closely spaced basing. As discussed before, superhard silos also force the Soviets to increase weapon yield which would result in a reduction of the total number of reentry vehicles in the SS-18 force. Such a reduction could exceed 3000 reentry vehicles for the projected Soviet capabilities in the late 1980s.

(S) [redacted]

Table 5.2.2-2. (U) CSB 100/300 with Concealment – Performance Against Long-Term Responsive Threats (Assumes Full U.S. Rideout)

SECRET

ATTACK	YIELD/CEP	FIRST WAVE SURVIVORS (%)		SURVIVORS TO SS-18 EXH (%)		#WAVES TO 10% P_S		TOTAL ATTACK PRICE (SS-18 EQUIV)		TOTAL ATTACK DURATION (HRS)	
	(MT/FT)*	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	

*ASSUMES SOVIET DUST HARDENED RVs

SECRET

(U) With growth options, performance is considered outstanding. Likely growth options include additional silos beyond the original 300. A non-treaty constrained ballistic missile defense could also be a good growth option for closely spaced alternatives.

(U) Other countermeasures applicable to closely spaced basing without concealment (Section 5.2.1.3) also apply. This alternative rates outstanding in resilience to threat options.

d. **Siting/Environment/Public Interest (U)**

(U) Primary siting considerations are depth to rock and water, terrain, minimum parcel size, coast and national border standoff distances, population avoidance, significant environmental and cultural feature avoidance, and proximity to a suitable support base. The candidate areas that have been identified for siting are areas near Cannon Air Force Base, New Mexico; Indian Springs Auxiliary Air Field, Nevada; Nellis Air Force Base, Nevada; F. E. Warren Air Force Base, Wyoming; and central Nevada. One alternative could include deployment in more than one of these locations. This concept is known as split-basing.

(U) Partial field verification work has been conducted in Nevada, New Mexico, and Wyoming which provides confidence in the geotechnical feasibility.

(U) Deployment requires approximately 45,000 acres of new land that would be fenced and removed from public access. Approximately 1000 acres will be disturbed due to silos, roads, and new operational and support facilities. Operations and maintenance requires approximately 3300 people, with peak year employment expected to reach 9000 during the construction period. In-migration of construction, operations, support personnel and their families will result in increased demand for land, housing, and public services. Environmental impacts on all resources will be comparatively larger than for closely spaced basing 100/100. Socioeconomic impacts due to a large in-migration are expected to be large. The opportunity to avoid sensitive land use is low, and acreage requirements are high.

(U) Public interest issues could include private land acquisition, public access to the deployment area, the effects of population growth, and competition for water.

e. Technical Issues/Risk (U)

(U) Issues related to superhardening and close spacing are discussed in Section 5.2.1.3. The additional feature of missile concealment was addressed in the late 1970s and during the initial phase of multiple protective shelter full-scale development program in the early 1980s.

(U) For concealment basing considerations, potential threats against the following three generic types of signatures were identified:

- Physical signature
- Operational signature
- Internal information signature

(U) Detection of missile location by collecting and analyzing physical signature data can be countered by design features to reduce the observables by simulators and special countermeasures. Site security and a standoff distance for public access of about three-quarters of a mile are important. Internal information collection can be mitigated by having sensitive information compartmented and structured so that the data do not yield specific patterns to disclose missile location. Personnel access to this data will be limited so that knowledge of missile location is constrained. Collection of operational signature data can be mitigated by having operations and maintenance crews use the same equipment and procedures within the same time intervals at missile and simulator sites. In summary, missile concealment is not considered to be a technical feasibility constraint.

f. **Arms Control (U)**

(U) Like the baseline closely spaced basing plan which involves an equal number of missiles and superhardened silos, this alternative would be consistent with SALT I or II if either were in effect at the time of deployment. While closely spaced basing is a non-fixed launcher system, the lack of concealment could create an impression that the silos, as they are in conventional intercontinental ballistic missile basing methods, are fixed intercontinental ballistic missile launchers. Concealing the missiles, by adding silos, increases location uncertainty. The transportability of the missile and its operational support equipment is used to preserve location uncertainty. This serves to strengthen the perception that the silos are not new fixed intercontinental ballistic missile launchers whose construction would be prohibited by Strategic Arms Limitation Treaties I and II if either were in effect at the time of deployment. Such a system would be compatible with existing agreements.

(U) Closely spaced basing with concealment is compatible with the United States' START objectives. The missile deployment greatly adds to force effectiveness and stresses the effectiveness of current Soviet intercontinental ballistic missile forces. Thus, it provides significant negotiating leverage with the Soviets. It would provide the U.S. with the flexible, effective, high quality force necessary to support the START initiatives.

(U) A major U.S. objective in START is effective verification. Closely spaced basing with concealment raises verification concerns experienced with all systems that depend on preservation of location uncertainty for survival. It would require that cooperative measures be taken to assure effective verification. Predeployment verification at a designated missile assembly building could be used to facilitate national technical means verification. This technique, based on verification methods for submarine-launched ballistic missiles, has been incorporated into the system design. Additional cooperative measures, such as on-site monitors or limited access to deployment areas, could also facilitate verification.

5.2.2.4 Missile Excursions (U)

a. **Common Missile (U)**

(U) The discussion of the Common Missile excursion to Peacekeeper for Closely Spaced Basing (paragraph 5.2.1.4) applies.

(U) Concealment considerations are essentially the same as for Peacekeeper. The mitigating approaches for operational and internal signatures are identical. Physical signatures are comparable; simulators and special countermeasures are also expected to be similar. This missile excursion would result in an initial operational capability of 1990, four years later than Peacekeeper.

b. Improved Minuteman III (U)

(U) The discussion comparing the Improved Minuteman III excursion to Peacekeeper in closely spaced basing (paragraph 5.2.1.4) applies.

(U) Concealment mitigation methods for operational and internal signatures are identical. Even though the improved Minuteman III missile is considerably lighter than Peacekeeper, accompanying operational support equipment is similar to Peacekeeper and concealment physical signatures are expected to be comparable. Special countermeasures and simulators will also be similar.

(U) An initial operational capability of 1987 is paced by improvements to Minuteman III.

c. Small Missile (U)

(U) Not considered due to the extremely large number of silos required to incorporate concealment with 1,000 small missiles.

5.2.2.5 Summary (U)

(U) This basing mode combines the key features of closely spaced basing superhardened silos and close spacing. It also incorporates key features of multiple protective shelters, aimpoint proliferation with missile concealment, to attain the required survivability.

(U) The deployment of 100 Peacekeeper missiles with 300 closely spaced superhard silos is a significant step toward maintaining deterrence despite increases in threat capability. Growth to more silos and/or defense can promise stability through the 1990s.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

- (S) [redacted]
- (S) [redacted]
- (S) [redacted]

(S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

- (U) **Missile Excursions:**

  - Common Missile - Good. Provides less capability than the Peacekeeper baseline due to reduced hard target kill capability.

  - Improved Minuteman III - Outstanding. Due to the 1050 silos deployed, the Soviet attack price would be a factor of 3.5 times higher than the Peacekeeper baseline assuming the same in-place hardness is achieved.

ATTACK PRICE (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) INCLUDING PINDOWN WEAPONS (U)

SECRET

[redacted]

SECRET

ATTACK DURATION (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

MILITARY CAPABILITY: (S) [redacted]

- (U) **Missile Excursions:**

  - Common Missile - Fair. With decreased accuracy fewer (about 400) time-urgent hard targets would be at risk.

  - Improved Minuteman III - Outstanding. Provides the same capability as the Peacekeeper baseline.

SURVIVABILITY: (S) [redacted]

- (U) **Missile Excursions:** Outstanding. Soviet attack scenarios are more complicated due to the increased number of silos. Because Minuteman excursion calls for 1050 silos it is not feasible to pin down. The probability of retaliation is therefore very high.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
***(ASSUMES FULL U.S. RIDEOUT) (U)**

SECRET

[redacted]

SECRET

ENDURANCE: (S) [redacted]

- (U) **Missile Excursions:** Good. Equivalent capability can be incorporated into either missile excursion.

RESILIENCY: (S) [redacted].

- (U) **Missile Excursions:** Outstanding. The growth capability is independent of the missile used with the exception of differences in initial deployment size.

SECRET

Reactive Threat Description	Time Frame*	Potential Response
[redacted]	[redacted]	[redacted]
[redacted]		

SECRET

DEFENDABILITY: (U) Outstanding. Ballistic missile defense increases the attack duration and requires a large pin attack to deny trans-attack flyout. Effective defense of this basing mode requires use of 100 interceptors in a preferential defense of the 100 Peacekeepers concealed in 300 silos.

- (U) **Missile Excursions:**

  - Common Missile - Outstanding. The defendability of the common missile (170/300) in this basing mode would be essentially the same as for Peacekeeper.

  - Improved Minuteman III - Good. The increase in the number of silos for Minuteman III (350/1050) would require a larger number of interceptors (250) for preferential defense. This number of interceptors would exceed the Anti-Ballistic Missile Treaty limits.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)	Peacekeeper	Common	Improved Minuteman III
R&D	10.1	10.0	7.6
Production	19.1	19.4	41.3
Military Construction	7.7	7.5	30.0
Total Acquisition*	36.9	36.9	78.9
10 Year O&S	4.0	4.3	7.8
	40.9	41.2	86.7

*Includes contingency for potential hardness uncertainty, command/control and communications, and sensor system integration.

SCHEDULE: (U)

	Peacekeeper	Common	Improved Minuteman III
Rating	Outstanding	Poor	Fair
IOC	1986	1990	1988
FOC	1989	1993	1992

IOC Schedule Constraints: (U)

(U) Peacekeeper and Improved Minuteman III

- Congressional restriction on design is tied to Congressional review of the Presidential basing recommendation and the completion of the environmental impact analysis process.
- Environmental impact analysis process completion is scheduled for January 1984.
- Land acquisition cannot begin prior to environmental impact analysis process completion.
- Special efforts are required to achieve the land availability needed by April 1984 since a schedule, based on environmental impact analysis process completion in January 1984, would not have land available until June 1984.

(U) Common Missile and Improved Minuteman III

- Missile development is the primary constraint for each excursion.

TECHNICAL RISK: (U) Fair. There are no pacing technology issues, however, validation tests are required for concealment and silo hardness verification.

- **(U) Missile Excursions:**
  - Common Missile - Fair. The risk is associated with meeting the Air Force hardness requirements, both in-place and in-flight, without compromising Navy requirements for submarine use.
  - Improved Minuteman - Fair. Same as baseline.

OPERABILITY/SUPPORTABILITY: (U) Good. The system has additional requirements over the closely spaced basing 100 silo system due to concealment and exchange operations and the larger deployment area, however the differences are not significant enough to lower the rating.

- **(U) Missile Excursions:**
  - Common Missile - Fair. Increases in manpower would be required to support the additional missiles deployed over a larger area.
  - Improved Minuteman III - Marginal. The concealment requirement and large deployment areas require a significant investment in manpower, facilities, and support equipment for 350 missiles deployed in 1050 silos.

SITING: (U) Good. One base is required. There is suitable area for 300 silos at F. E. Warren AFB. Four other potential areas exist which support alternate site layouts.

- **(U) Missile Excursions:**
  - Common Missile - Good. Increases in manpower would be required to support the additional missiles deployed over a larger area.
  - Improved Minuteman III - Fair. Three potential areas have been identified. A new support base would likely be required.

ENVIRONMENT: (U) Fair. The additional land area at F. E. Warren AFB required for this system over the closely spaced basing 100 silo alternative and the larger personnel requirements for construction and operation result in comparatively larger impacts in all categories. However, these impacts appear resolvable through appropriate mitigations.

- **(U) Missile Excursions:**

  - Common Missile - Fair. Increases in manpower would be required to support the additional missiles deployed over a larger area.

  - Improved Minuteman III - Marginal. The land area required, expected population in-migration, and attendant demands on existing resources will create large impacts.

PUBLIC INTERFACE: (U) Good. Access to the weapon system is controlled. Public exposure to the weapon system would be minimal. This differs from closely spaced basing (100/100) since the area support center for 100/100 would be contiguous with the array. This one area support center would support all arrays for this alternative. This results in the missile, mated with the warhead, being transported on newly constructed roads to which public access would be possible.

- **(U) Missile Excursions:**

  - Common Missile - Fair. Similar to Peacekeeper baseline; however there would be 170 missiles deployed versus 100 for Peacekeeper.

  - Improved Minuteman III - Fair. Although there are more missiles and silos in this excursion, the system concept is similar to the baseline. The same rating is judged appropriate because public exposure to the weapon system would be minimal.

POLICY (U)

ARMS CONTROL: (U) Outstanding. The system would be compatible with provisions of SALT I and/or SALT II if either were in effect at the time of deployment. Deployment of the Peacekeeper missile in this basing mode would increase force effectiveness needed to support arms reduction. It provides significant leverage for arms reduction negotiations and is verifiable.

- **(U) Missile Excursions:**

  - Common Missile - Good. The 1990 IOC provides reduced leverage for current arms reduction negotiations.

  - Improved Minuteman - Good. May not provide as much leverage in negotiations as Peacekeeper baseline.

FOREIGN POLICY: (U) Outstanding. Deployment will enhance U.S. military capability required for deterrence and will add to the perception of U.S. resolve to redress the current strategic imbalance. Closely spaced basing deployment by demonstrating U.S. political will to strengthen the land based leg of the Triad will help sustain and support key allied government support for NATO nuclear force modernization.

- **(U) Missile Excursions:**
  - Common Missile - Good. The 1990 IOC could cause this alternative to have a reduced effect on sustaining and strengthening allied support for NATO nuclear force modernization.
  - Improved Minuteman - Good. This alternative may not be perceived as a serious attempt to redress the strategic imbalance.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

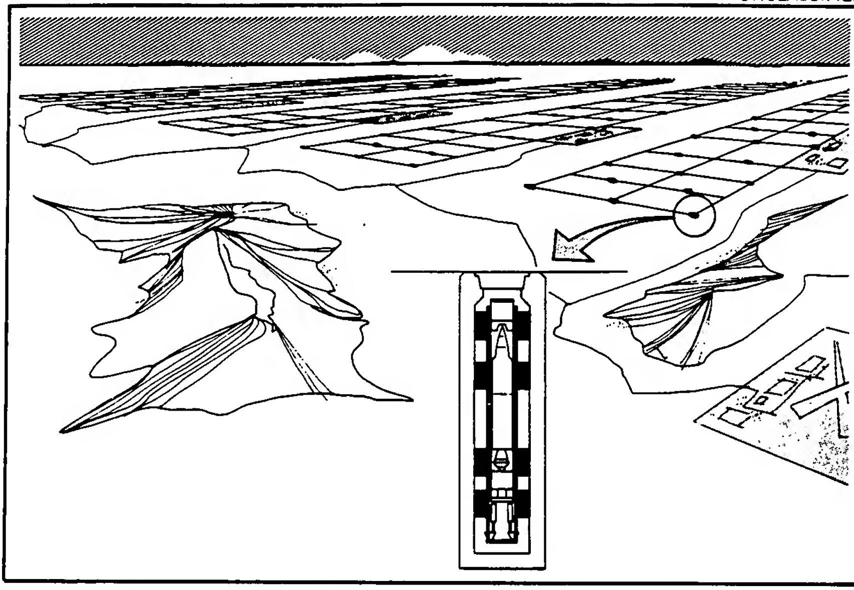
- Prompt strike capability against hard targets
- High effectiveness against current NIE threats
- Extremely high Soviet price to negate system
- Low confidence attack
- Transattack launchability
- Near term availability (IOC-1986)
- Resilient and defendable
- Requires the Soviets to replace "small" MIRVs with larger RVs, thus decreasing Soviet warhead inventory and targeting flexibility
- Throw weight flexibility for penaids and/or large yield RVs.

NEGATIVE FEATURES: (U)

- Technical validation not final.

5.2.3 CLOSELY SPACED BASING - SMALL MISSILE (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 1000 small missiles
- 1000 superhard vertical silos (5 modules, 200 silos each)
- 2000 foot spacing
- 10 superhard launch control centers

5.2.3.1 Concept (U)

(U) This concept is similar to that of Section 5.2.1, except that 1000 small missiles are used in 1000 appropriately sized silos.

5.2.3.2 Description (U)

(U) The silos are spaced at 2000 feet in a column; in a hexagonal pattern a few silos wide, forming five long north-south arrays of 200 silos each. System operation is the same concept as closely spaced basing discussed in Section 5.2.1.

(U) The superhard silos for this alternative are smaller than those for closely spaced basing, due to the small missile. The silo is a composite reinforced-concrete and steel-plate structure with walls approximately 4 feet thick and a closure approximately 8 feet thick.

5.2.3.3 Technical Assessment (U)

a. Survivability (U)

(U) The discussion on closely spaced basing survivability in Section 5.2.1.3 applies. Compared to closely spaced basing, there are 10 times as many targets and this number can easily exhaust the Soviet intercontinental ballistic missile threat. Pindown attacks against this alternative, due to the large area the 1000 silos are deployed within, are so costly as to be essentially unfeasible. Therefore, the probability of retaliation is very high.

[redacted]

Table 5.2.3-1. (U) CSB With Small Missile (1000/1000) - Performance Against Projected Threat Excursion (1989) (Assumes Full U.S. Rideout)

SECRET

ATTACK	YIELD/CEP	FIRST WAVE SURVIVORS (%)		SURVIVORS TO SS-18 EXH (%)		#WAVES TO 10% P_S		TOTAL ATTACK PRICE (SS-18 EQUIV)		TOTAL ATTACK DURATION (HRS)	
	(MT/FT)	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

SECRET

b. Attack Scenarios (U)

(U) The analysis of attack scenarios is identical to closely spaced basing except that this basing alternative has nearly ten times the attack price and much higher attack

duration than closely spaced basing (Section 5.2.1.3). Such attacks are not plausible with projected Soviet resources.

c. **Resiliency to Threat Enhancement (U)**

(U) The same growth options and features that apply to closely spaced basing also apply (Section 5.2.1.3).

(S) [redacted]

Table 5.2.3-2. (U) CSB 1000/1000 With Small Missile - Performance Against Long-Term Responsive Threats (Assumes Full U.S. Rideout)

SECRET

ATTACK	YIELD/ CEP (MT/FT)*	FIRST WAVE SURVIVORS(%)		SURVIVORS TO SS-18 EXH(%)		# WAVES TO 10% P_S		TOTAL ATTACK PRICE (SS-18 EQUIV)		TOTAL ATTACK DURATION (HRS)	
		U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.	U.S.	S.U.
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]		[redacted]		[redacted]		[redacted]		[redacted]	

[redacted]

SECRET

(U) The growth options of concealment and Ballistic Missile Defense, though not required in the foreseeable future, can enhance performance against the large booster resources required to draw down the system.

(U) Other countermeasures shown in Section 5.2.1.3 also apply. This alternative has outstanding resiliency.

d. **Siting/Environment/Public Interests (U)**

(U) Primary siting considerations include depth to rock and water, slope, minimum parcel size, coastline and national border standoff distances, population avoidance, proximity to a suitable support base, and significant environmental and cultural feature avoidance. Locations that have been preliminarily identified as potentially suitable for

deployment are near Cannon Air Force Base, New Mexico; Nellis Air Force Base, Nevada; and in the central Nevada area.

(U) Extensive system area requirements and layout siting restrictions lower the flexibility and potential enhancement capability of this system compared to closely spaced basing of Peacekeeper 100 or 300 silos. However, within the three suitable siting areas there is parcel siting flexibility. Confidence is high for geotechnical suitability due to partial field verification done in the three areas.

(U) Deployment requires approximately 145,000 acres of new land, of which 10,000 acres will be permanently disturbed for silos, roads, and new operational and support facilities. If an existing support base is not available, a new one will have to be built and will require about 8,000 additional acres. Operations and maintenance requires approximately 5,000 people, with peak year employment expected to reach 12,000 during the construction period. If a new base is required the employment numbers will increase to 8,000 and 20,000, respectively.

(U) In-migration of construction, operations, support personnel and their families will increase demand for land, housing, and public services. In a rural area with minimal existing support capabilities, impacts will be large. Impacts from projected water use and recreation-related activities of in-migrants will impact sensitive areas. Large acreage requirements will result in large land use impacts.

(U) Public interest issues could include effects of population growth and competition for resources such as labor and water.

e. Technical Issues (U)

(U) The technical issues are the same as closely spaced basing (Section 5.2.1.3).

f. Arms Control (U)

(U) This basing mode has some of the same arms control advantages as closely spaced basing (Section 5.2.1). Because it employs essentially the same technology as closely spaced basing, it would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It is effectively verifiable under existing agreements and would probably be the same under Strategic Arms Reduction Talks. It provides an

incentive for the Soviets to negotiate in that it demonstrates United States willingness to modernize and increases United States prompt hard target capability which diminishes the utility of large intercontinental ballistic missile forces. However, the later availability of this system somewhat diminishes this leverage. While this concept supports United States START objectives, its deployment would require the United States to reevaluate its proposed missile ceiling. The increased force effectiveness of this system would support the United States objective of significant reductions.

5.2.3.4 Missile Excursions (U)

(U) None.

5.2.3.5 Summary (U)

(U) This alternative with its 1000 superhard silos, each with a small missile, provides significant survivability and capability.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

- (S) [redacted]
- (S) [redacted]
- (S) [redacted]

(S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

ATTACK PRICE (10% SURVIVORS)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ATTACK DURATION (10% SURVIVORS)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

MILITARY CAPABILITY: (S) [redacted]

SURVIVABILITY: (S) [redacted]

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
*(ASSUMES FULL U.S. RIDEOUT) (U)

~~SECRET~~

[redacted]

~~SECRET~~

ENDURANCE: (~~S~~) Good. [redacted]

RESILIENCY: (~~S~~) [redacted]

~~SECRET~~

Reactive Threat Description	Time Frame*	Potential Response
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		

~~SECRET~~

DEFENDABILITY: (U) Good. Ballistic missile defense can increase the attack duration and requires a large pindown attack to deny trans-attack flyout. However, defense of this alternative requires a large number of interceptors and mobile ABM components which are not consistent with the ABM Treaty limitations.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

	Small Missile
R&D	9.6
Production	43.2
Military Construction	16.9
Total Acquisition*	69.7
10 Year O&S ($0.65/year)	6.5
Total Life Cycle	76.2

*Includes contingency for potential hardness uncertainty, command/control and communications, and sensor system integration.

SCHEDULE: (U)

	Small Missile
Rating	Poor
IOC	1990
FOC	1994

IOC Schedule Constraints: (U)

- Basic siting decision is a potential constraint
- Following the basing decision the environmental impact analysis process will determine the start date for site specific design and land acquisition
- Small missile development

TECHNICAL RISK: (U) Fair. The rating results from new missile development requirements to achieve the accuracy (with incorporation of advanced inertial reference sphere) and reduced missile weight. Validation tests will be required on the smaller silo for assurance of hardness and egress capability.

OPERABILITY/SUPPORTABILITY: (U) Fair. This system is operable and supportable with a moderate manpower requirement.

SITING: (U) Fair. Three potential areas have been identified. A new support base would likely be required.

ENVIRONMENT: (U) Marginal. The large land area required, large expected in-migration, and attendant demands on existing resources will create large impacts.

PUBLIC INTERFACE: (U) Fair. Public exposure exists when the missile is transported from the area support center to the deployment area.

POLICY (U)

ARMS CONTROL: (U) Good. This system would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. Deployment would not provide as much negotiating leverage for START negotiations due to the later availability of the system. It is verifiable by national technical means.

FOREIGN POLICY: (U) Good. Deployment will enhance U.S. military capability required for deterrence and will add to the perception of U.S. resolve to redress the current strategic imbalance. Closely spaced basing small missile, by demonstrating U.S. political will to strengthen the land based element of the Triad, will help sustain and strengthen key allied government support for NATO nuclear force modernization. However, the later IOC of this system will lessen its influence on NATO modernization decisions.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- High effectiveness against likely threats
- Extremely high Soviet price to negate system
- Prompt strike capability against hard targets
- Low confidence attack
- Trans-attack launchability
- Resilient

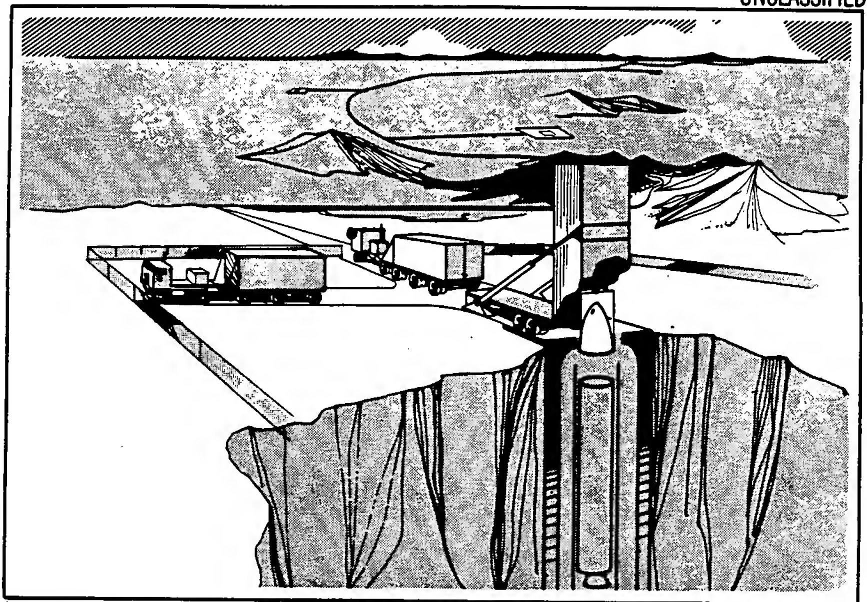
NEGATIVE FEATURES: (U)

- Late IOC
- Large environmental impacts
- Technical validation not final
- No throw weight flexibility

5.2.4 Widely Spaced Basing in Superhard Silos

5.2.4 WIDELY SPACED BASING IN SUPERHARDENED SILOS (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 100 Peacekeeper missiles
- 100 superhard vertical silos
- Spacing 1-5 miles
- 4 superhard launch control centers
- Site security like Minuteman
- Existing or new base
- On-site missile assembly
- Launch control system like that of closely spaced basing

5.2.4.1 Concept (U)

(U) The widely spaced basing concept features superhardened silos arranged in a Minuteman-type deployment pattern. Silo hardness is the fundamental contributor to the survivability of this system.

5.2.4.2 Description (U)

(U) Widely spaced basing would deploy 100 Peacekeeper missiles in 100 superhard vertical silos. All system facilities are constructed with enhanced levels of hardness to improve survivability. Spacing between sites is between 1 and 5 miles. Each silo protects a shock-isolated missile and its operational support equipment.

(U) The 100-missile system consists of two 50-missile squadrons with a single operating base. The missile is assembled on-site at the silo. The base of operations includes facilities for stage and equipment maintenance procedures. Each 50-missile squadron contains two manned superhard launch control centers, either of which can launch all missiles approximately 1 minute from receipt of a validated launch command. Command and control information can also be provided by airborne or ground mobile launch control centers. Communication links between the silos and the control centers include fiber optics, low frequency radio, and high frequency radio. Emergency and survival power are supplied by batteries.

(U) Physical security of the widely spaced basing system is modeled after that of Minuteman. Silos are unmanned, and security forces are alerted by intrusion sensors.

5.2.4.3 Technical Assessment (U)

a. Survivability (U)

(U) Survivability is achieved by protecting the Peacekeeper missile in superhard silos of the same design as closely spaced basing. Because of the superhard silos, this alternate is not vulnerable to the current Soviet Force. For projected Soviet capability, the wide space between silos negates two-for-one bonus kills, but also effectively removes the fratricide benefits and uncertainties discussed with closely spaced basing. As a consequence, the widely spaced basing alternative can be negated with a single wave two on one, large yield attack. Survivability against the projected Soviet threat is poor.

b. Attack Scenarios (U)

(S) [redacted]

[redacted]

c. **Resilience (U)**

(U) In response to Soviet threat growth, widely spaced basing could be enhanced with expansion or defense. Defense would require a large number of ballistic missile interceptors, due to the large deployment area. Section 5.3 addresses ballistic missile defense.

d. **Siting/Environment/Public Interests (U)**

(U) Primary siting considerations include: sufficient suitable area to accommodate the system, depth to rock and water, coastline and border standoff, population avoidance, and significant environmental and cultural feature avoidance. The following seven areas have been identified as suitable for deployment of this system: southeast Wyoming/southwest Nebraska, north Texas panhandle, south Texas panhandle, west-central Utah, south-central Nevada, west-central Nevada, and east-central New Mexico.

(U) Partial field verification work has been conducted in Nevada, New Mexico, and Wyoming which provides confidence in the geotechnical feasibility. Nominal 5-mile spacing of the silos allows fewer siting opportunities. However, the widely spaced nature allows for individual siting flexibility to avoid geotechnically unsuitable areas.

(U) Deployment requires approximately 23,000 acres, of which 3,500 will be permanently disturbed due to silos, access roads, and new operational and support facilities. If a support base is not already available, a new one will have to be built and will require 6,000 additional acres. The support base and areas immediately surrounding the silos will be fenced. Operations, maintenance, and support requires 3,000 people, with peak employment reaching 6,200 during the construction period. If a new base is required, the employment numbers will increase to 6,000 and 10,000, respectively.

(U) Increased in-migration of construction, operations, support personnel and their families would result in increased demand for land, housing, and public services. If the system is deployed in relatively remote areas, the socioeconomic impacts would be considerably higher than for deployment where a support base and local community infrastructure exists. Because of the widely spaced nature of the basing mode, there is siting flexibility to avoid sensitive biological and archaeological areas. However, effects of project water use and disturbance by the activities of in-migrants will impact sensitive areas.

(U) Public interest issues could include effects of population growth, especially if located in remote areas, land use, especially if located in a region of intense farming and grazing, and competition for water.

e. Technical Issues (U)

(U) The hardening issue for widely spaced basing is the same as described for closely spaced basing in Section 5.2.1.

f. Arms Control (U)

(U) Widely spaced basing shares similar technology with closely spaced basing. As with closely spaced basing it would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. Widely spaced basing supports United States START objectives. It provides significant negotiating leverage in START by demonstration of United States resolve to modernize and counter Soviet capability that threatens United States strategic forces, thus diminishing the utility of Soviet large intercontinental ballistic missile forces. Increased force effectiveness also supports the United States objective of military significant reductions. The system is verifiable through national technical means.

5.2.2.4 Missile Excursions (U)

a. Common Missile (U)

(U) The discussions of the common missile excursion to peacekeeper in closely spaced basing (section 5.2.1.4) applies. On site missile assembly considerations are comparable to those of Peacekeeper, stage transporters will be smaller. As in other

Common Missile excursions, the estimated IOC of 1990 forecloses fielding a modernized Common Missile intercontinental ballistic missile force in the mid-1980s.

b. Improved Minuteman III (U)

(U) The discussion of Section 5.2.1.4 applies.

c. Small Missile (U)

(U) Not considered due to the extremely large area required to site 1,000 silos in a widely spaced basing array.

5.2.4.5 Summary (U)

(U) Widely spaced basing depends on the same technology as closely spaced basing. Increased land requirements and the lower stress of the Soviet threat decrease the attractiveness of widely spaced basing as an alternative.

SECRET

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

- (U) **Missile Excursions:**
  - Common Missile - Fair. Although this alternative would have a higher Soviet attack price (1.7 times) than the baseline due to additional silos deployed, the difference is not sufficient to merit a higher rating.
  - Improved Minuteman III - Good. With 350 silos deployed, this alternative would have a substantially higher Soviet attack price (nearly 470 SS-18 equivalents) and fair survivability in the Soviet view. These subfactors raise the overall rating to good.

ATTACK PRICE (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ATTACK DURATION (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

SECRET

MILITARY CAPABILITY: (S) [redacted]

- **(U) Missile Excursions:**
  - Common Missile - Fair. Reduced guidance accuracy places fewer (about 400) time-urgent hard targets at risk.
  - Improved Minuteman III - Outstanding. Same as PeaceKeeper.

SURVIVABILITY: (S) [redacted]

- **(U) Missile Excursions:** Survivability against projected attack scenarios remains poor. However, due to additional silos, the Soviet attack price is higher.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
***(ASSUMES FULL U.S. RIDEOUT) (U)**

SECRET

[redacted]

SECRET

ENDURANCE: (S) [redacted]

- **(U) Missile Excursions:**
  - Common Missile - Poor. Same as Peacekeeper.
  - Improved Minuteman III - Poor. Same as Peacekeeper.

RESILIENCY: (S) [redacted]

- **(U) Missile Excursions:**
  - Common Missile - Marginal. Similar to baseline.
  - Improved Minuteman III - Marginal. Similar to baseline.

SECRET

Reactive Threat Description	Time Frame*	Potential Response
[redacted]	[redacted]	[redacted]
[redacted]		

SECRET

DEFENDABILITY: (U) Fair. Defense is feasible for this basing mode. The presence of defense significantly increases the required attack price. However, effective defense of this basing mode requires a large number of interceptors and mobile antiballistic missile components which are not consistent with the Antiballistic Missile Treaty limitations.

- **(U) Missile Excursions:**
  - Common Missile - Fair. Similar to Peacekeeper.
  - Improved Minuteman III - Fair. Similar to Peacekeeper however a larger number of interceptors are required.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)	Peacekeeper	Common	Improved Minuteman III
R&D	9.4	9.5	7.2
Production	13.4	14.6	23.5
Military Construction	6.1	9.0	13.0
Total Acquisition*	28.9	33.1	43.7
10 Year O&S ($0.304/yr)	3.0	2.9	5.1
	31.9	36.0	48.8

*Includes contingency for potential hardness uncertainty, command/control and communications, and sensor system integration.

SCHEDULE: (U)

	Peacekeeper	Common	Improved Minuteman III
Rating	Outstanding	Poor	Fair
IOC	1986	1990	1988
FOC	1989	1993	1991

IOC Schedule Constraints (U)

(U) Peacekeeper and Improved Minuteman III

- Completion of the environmental impact analysis process paces the start of site specific design and land acquisition

(U) Common Missile and Improved Minuteman III

- Missile development is the primary constraint for each excursion.

TECHNICAL RISK: (U) Good. This system has no pacing technology issues. However, validation tests for silo hardness are required.

- **(U) Missile Excursions:**
  - Common Missile - Fair. The risk is associated with meeting the Air Force hardness requirements, both in-place and in-flight, without compromising Navy requirements for submarine use.
  - Improved Minuteman III - Good. Same as Peacekeeper.

OPERABILITY/SUPPORTABILITY: (U) Fair. This system is operable and supportable with a moderate manpower investment. Maintenance and logistics procedures are well defined. Dispersal of the sites over a large area adds some measure of difficulty in accessibility and security response times.

- **(U) Missile Excursions:**
  - Common Missile - Fair. Increases in manpower would be required to support the additional missiles deployed over a larger area.
  - Improved Minuteman III - Marginal. Same type of impacts as Peacekeeper missile but more numerous due to higher number of silos (350 versus 100) and larger deployment area.

SITING: (U) Good. Seven areas have been identified as suitable for WSB. There is a potential requirement to construct a new support base depending on the siting area selected.

- **(U) Missile Excursions:**
  - Common Missile - Good. However, comparatively larger land area is required than for 100 Peacekeeper silos.
  - Improved Minuteman III - Fair. There are fewer suitable sites for 350 silos than for the baseline Peacekeeper system. A large area support center may be required for this missile excursion.

ENVIRONMENT: (U) Fair. The population in-migration and construction activities and their attendant demands on existing resources in a rural area result in moderate impacts on biology, water resources, air quality, land use and cultural resources. A fairly large impact on socioeconomics in the region is expected.

- **(U) Missile Excursions:**
  - Common Missile - Fair. However, the larger land requirements for 170 silos will result in comparatively larger impacts than for 100 Peacekeeper silos.
  - Improved Minuteman III - Marginal. The higher number of missiles and silos at widely spaced intervals create higher impacts than for either of the above alternatives.

PUBLIC INTERFACE: (U) Good. Public exposure to the weapon system is infrequent, much the same as the currently deployed Minuteman force.

- **(U) Missile Excursions:**
  - Common Missile - Good. Public interface is essentially the same as for the Peacekeeper baseline.
  - Improved Minuteman III - Good. As with Peacekeeper and the common missile excursion, the baseline concept includes on-site assembly. There is no public exposure to boosters with mated warheads.

POLICY (U)

ARMS CONTROL: (U) Outstanding. This system would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. Deployment in widely spaced basing would increase force effectiveness needed to support negotiations for significant reductions. It provides START leverage and is verifiable through national technical means.

- **(U) Missile Excursions:**
  - Common Missile - Good. The 1990 IOC may provide reduced leverage for current arms reduction negotiations.
  - Improved Minuteman III - Good. May not provide as much leverage in negotiation as Peacekeeper baseline.

FOREIGN POLICY: (U) Outstanding. This system demonstrates U.S. resolve to modernize and redress the current strategic imbalance. By demonstrating U.S. political will to strengthen the land based leg of the Triad, its deployment will help sustain and strengthen key allied government support for NATO nuclear force modernization.

- **(U) Missile Excursions:**
  - Common Missile - Good. The later IOC could cause this alternative to have a reduced effect on sustaining and strengthening allied support for NATO nuclear force modernization.
  - Improved Minuteman III - Good. This alternative may not be perceived as a serious attempt to redress the strategic imbalance.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- Prompt strike capability against hard targets
- High effectiveness against current threat
- Several suitable areas for deployment
- Throw weight flexibility for penaids and/or large yield RVs

NEGATIVE FEATURES: (U)

- Long-term threat negates system quickly.

5.2.5 SOUTH SIDE BASING (U)

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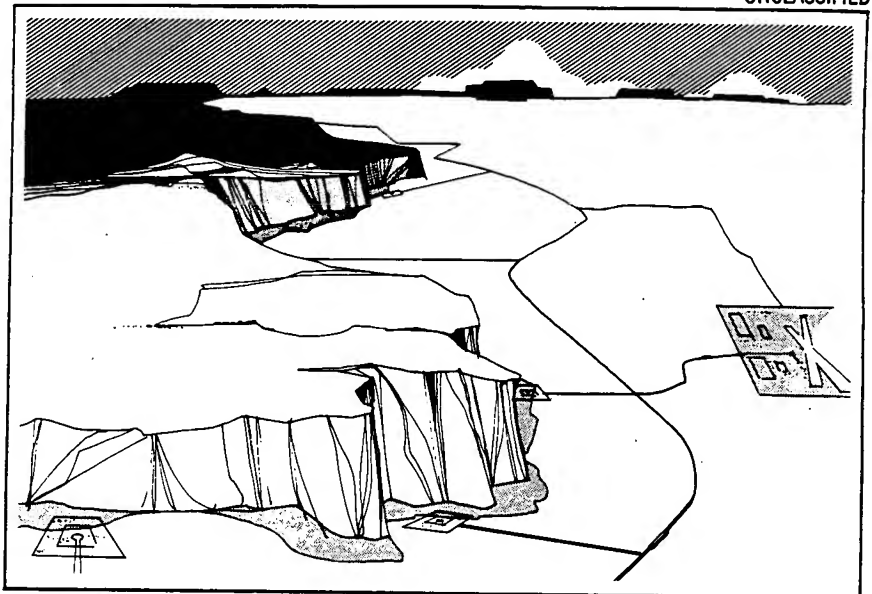


UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 100 Peacekeeper missiles
- 100 superhard vertical silos
- Spacing up to 1 mile apart
- Terrain very close to high mountains with south facing slopes
- Point security like Minuteman
- Number of launch control centers dependent on terrain and radio communications effectiveness with vertical silos
- New base
- System operated and maintained similar to closely spaced basing

5.2.5.1 Concept (U)

(U) South side basing uses local terrain relief, combined with silo hardening, for system survivability. South side basing forces the attacker to use higher warhead reentry angles, reducing their delivery accuracy. The concept is dependent on locating suitable

areas that afford sufficiently high mountains or ridges, reasonably flat south side terrain, and enough area to deploy the 100 missiles in superhardened silos.

(U) Attacking reentry vehicles normally approach from the north at fairly flat reentry angles. Locating the silos at the base of a steep slope forces the reentry vehicle detonation points beyond the silos, which reduces the destructive effects. An attempt to compensate by using a higher reentry angle could reduce the attacker's accuracy and payload capability.

5.2.5.2 Description (U)

(U) The hardware configuration, maintenance, and operation of the Peacekeeper in the south side basing concept is nearly identical to that of the Peacekeeper in the closely spaced basing concept. Mechanical, electrical, and launch control system hardware and silo design are similar. The flyout concept and timelines are the same. The physical security system differs in that it is a point security system due to terrain features. The number of superhard launch control centers depends on terrain and associated radio communications effectiveness.

5.2.5.3 Technical Assessment (U)

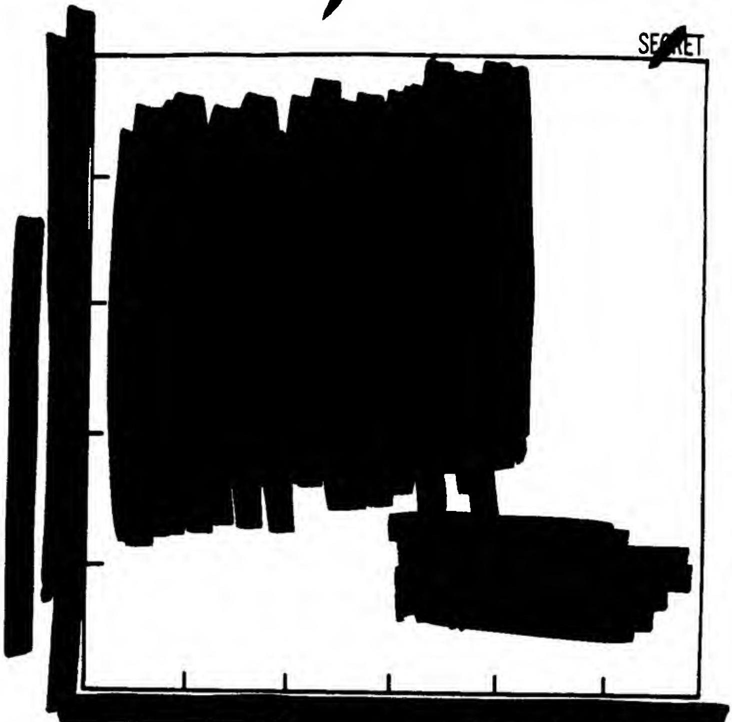
a. Survivability (U)

(S) [redacted]

b. Attack Scenario (U)

(S) [redacted]

SECRET



[redacted]

SECRET

Figure 5.2.5-1. (U) South Side Basing Slope Angles (1992)

[redacted]

SECRET

c. Resiliency to Threat Enhancement (U)

(U) Development of submarine-launched ballistic missiles with hard target kill capabilities which launch from non-northerly directions, accurate fractional orbit ballistic systems, or maneuvering reentry vehicles could mitigate the shielding effects of south facing mesas. However, only a submarine-launched ballistic missile large yield maneuvering reentry vehicle option appears to be capable of attacking south side basing by the early to mid-1990s. High-accuracy, low-yield intercontinental ballistic missile maneuvering reentry vehicles may be available by the mid- to late-1990s. United States electronic countermeasures could be used to jam terminal guidance system of maneuvering reentry vehicles or the fuzing, guidance, and communications links of other attacking reentry vehicles. Other United States' actions would be to find steeper slopes or proliferate more silos, but few sites are likely to be available for these options. No specific ballistic missile defense concept has been examined for south side basing.

d. Siting/Environment/Public Interests (U)

(U) Primary siting considerations include the relief and slope of adjacent mountains, nominally south-facing mountains, pediment slope, silo placement from the base of the mountain, depth to rock and water, coastline and national border standoff distances, avoidance of population, and significant environmental and cultural features avoidance. Potential areas which have been preliminarily identified for system deployment area are in central Utah, western and south-central Colorado, Idaho/southwestern Montana, and northwestern Wyoming.

(U) There may be a conflict between the constructibility and geotechnical criteria. The silos must be located close to the mountain to take advantage of shadowing, but depths of the alluvial deposits overlying the mountain geology may be less than the desired 150 to 200 feet of dry soil. Other construction difficulties unique to this basing mode are anticipated. Building near a 40% slope may involve dealing with mud slides, rock slides, heavy rainfall runoff, and other natural problems associated with high-relief areas.

(U) Deployment requires approximately 32,500 acres, of which 11,000 will be permanently disturbed due to silos, access roads, and a new support base.

(U) Operations, maintenance, and support requires about 5000 people, with peak year employment expected to reach 10,000 during the construction period. In-migration of construction, operations, and maintenance, and support personnel and their families will increase the demand for land, housing, and public services. Nearly all sites are remote areas with miminal existing support capabilities. Therefore, socioeconomic impacts will be large. Although biological and archaeological impacts would vary with the site, the topographic situation suitable for south side basing has a high likelihood of containing sensitive archaeological and biological resources.

(U) Public interest issues include effects of population growth and competition for available resources such as labor and water.

e. Technical Issues (U)

(U) Technical risks for south side basing involve two issues. As for all other basing alternatives employing superhard silos, further hardness validation testing is required to verify that proper hardness levels can be achieved. Also, construction in the rugged terrain needed for south side basing may be extremely difficult and expensive.

f. Arms Control (U)

(U) South side basing is similar to the baseline closely spaced basing concept and, as with closely spaced basing, would comply with SALT I and/or SALT II if either were in effect at the time of deployment. (See Section 5.2.1.)

(U) The system is verifiable because of the large size of the missile, fixed silos, and a well defined deployment area. Additional military capability and effectiveness provided by the system would provide negotiating leverage, and support United States objectives of force reductions. However, the somewhat later initial operational capability would result in less negotiating leverage than other alternatives.

5.2.5.4 Missile Excursions (U)

a. Common Missile (U)

(U) The discussion of the common missile excursion to Peacekeeper in closely spaced basing (Section 5.2.4.1) applies. The availability of suitable area to site 170 silos is a greater concern than those addressed in Section 5.2.5.4 for Peacekeeper due to the

increased number of sites required. As in other common missile excursions, the estimated initial operational capability of 1990 forecloses fielding a modernized common missile intercontinental ballistic missile force in the mid-1980s.

b. Improved Minuteman III (U)

(U) The discussion of Section 5.2.1.4 applies. The availability of suitable area to site 350 silos is even of greater concern than those above.

c. Small Missile (U)

(U) Not considered due to insufficient suitable areas for 1000 sites.

5.2.5.5 Summary (U)

(U) South side basing can make a contribution to the United States strategic posture if sufficiently steep slopes (much greater than 40 degrees) can be found. If these steep slopes can be found, other major system issues would be operation of the system and geological stability of the slope obviating a landslide from uphill nuclear detonation.

PERFORMANCE EVALUATION (U)

__ATTACK SCENARIO:__ (S) [redacted]

STRATEGIC CAPABILITY (U)

__DETERRENCE:__ (S) [redacted]

- **(U) Missile Excursions:**

  - Common Missile - Marginal. The slightly (by a factor of 1.7) increased number of silos does increase Soviet attack price or U.S. survivability, but fewer hard targets can be put at risk.

  - Improved Minuteman III - Good. The attack price and/or the number of survivors (Soviet view) would be 3.5 times higher due to the 350 deployed silos, assuming the same in-place hardness.

ATTACK PRICE (10% SURVIVORS)
(ASSUMES FULL U.S. RIDEOUT) (U)

~~SECRET~~

[redacted]

~~SECRET~~

ATTACK DURATION
(10% SURVIVORS) (U)

~~SECRET~~

[redacted]

~~SECRET~~

MILITARY CAPABILITY: (S) [redacted]

- **(U) Missile Excursions:**
  - Common Missile - Fair. With decreased guidance accuracy fewer (about 400) time-urgent hard targets at risk.
  - Improved Minuteman III - Outstanding. Provides the same capability as the Peacekeeper baseline.

SURVIVABILITY: (S) [redacted]

- **(U) Missile Excursions:**
  - Common Missile - Poor. Less than 10% survivors remain after Soviet attack.
  - Improved Minuteman III - Fair. Over 20% of the deployed force would be expected to survive a Soviet attack, due to the increased number of silos.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ENDURANCE: (S) [redacted]

- (U) **Missile Excursions:**
  - Common Missile - Poor. Few survivors remain.
  - Improved Minuteman III. Fair. The additional silos in this missile excursion result in higher survivability and the inherent endurance capability is more fully utilized.

RESILIENCY: (S) [redacted]

- (U) **Missile Excursions:**
  - Common Missile - Marginal. Similar to Peacekeeper.
  - Improved Minuteman III - Marginal. Similar to Peacekeeper.

SECRET

Reactive Threat Description	Time Frame	Potential Response
[redacted]	[redacted]	[redacted]

SECRET

DEFENDABILITY: (U) Marginal. Defense concepts for this alternative have limited effectiveness.

- **(U) Missile Excursions:**
  - Common Missile - Marginal. Same as for Peacekeeper.
  - Improved Minuteman III - Marginal. Same as for Peacekeeper.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)	Peacekeeper	Common	Improved Minuteman III
R&D	9.4	9.5	7.2
Production	13.6	14.9	23.8
Military Construction	4.6	6.5	10.5
Total Acquisition*	27.6	30.9	41.5
10 Year O&S	3.0	2.9	4.9
	30.6	33.8	46.4

*Includes contingency for potential hardness uncertainty, command/control and communications, and sensor system integration.

SCHEDULE: (U)

	Peacekeeper	Common	Improved Minuteman III
Rating	Fair	Poor	Fair
IOC	1988	1990	1988
FOC	1991	1993	1991

IOC Schedule Constraints: (U)

(U) Peacekeeper and Improved Minuteman III

- Basic siting decision is potential constraint.
- Following basing decision, EIAP completion paces site specific design and land acquisition.
- Possible construction delays due to geotechnical uncertainties.

(U) Common Missile and Improved Minuteman III

- Missile development is the principal constraint for each missile excursion.

TECHNICAL RISK: (U) Good. No new technology is needed. However, validation tests for construction feasibility and silo hardness are required.

- **(U) Missile Excursions:**
  - Common Missile - Fair. The risk is associated with meeting the Air Force hardness requirements, both in-place and in-flight, without compromising Navy requirements for submarine use.
  - Improved Minuteman III - Good. No pacing technology issues exist.

OPERABILITY/SUPPORTABILITY: (U) Fair. The system is operable and supportable with moderate manpower. Terrain and travel distances may complicate supportability somewhat.

- **(U) Missile Excursions:**
  - Common Missile - Fair. Increases in manpower would be required to support the additional missiles deployed over a larger area.
  - Improved Minuteman III - Marginal. Same type of impacts as Peacekeeper missile but more numerous due to higher number of silos (350 versus 100) and larger deployment area.

SITING: (U) Marginal. Four suitable areas have currently been identified. A new operating base is required in all locations. There are anticipated problems with constructibility at the proposed areas, and geotechnical uncertainties exist at these locations.

- **(U) Missile Excursions:**
  - Common Missile - Marginal. The increased number of silos (170) and geotechnical uncertainties may increase the problem of locating suitable sites.
  - Improved Minuteman III - Poor. The number of silos (350) and the unique siting requirements for this basing mode would severely restrict suitable sites.

ENVIRONMENT: (U) Marginal. Potential sites impinge on remote areas which have minimal existing project support capability. The in-migration of personnel will create large socioeconomic impacts. The extensive new base constructon and land requirements will likely generate large impacts on land use, air quality, existing water resources, biology, and cultural resources.

- **(U) Missile Excursions:**
  - Common Missile - Marginal. Impacts will be comparatively larger than for 100 Peacekeeper silos.
  - Improved Minuteman III - Poor. Suitable sites would likely be in remote and very sensitive areas. Mitigations may be much more difficult than for the smaller Peacekeeper deployment area.

PUBLIC INTERFACE: (U) Fair. There is no public exposure to nuclear weapons when they are confined to the support base or the silo sites. There would be some public exposure to the missile and warheads during occasional transport between the base and deployment area.

- **(U) Missile Excursions:**
  - Common Missile - Fair. Essentially the same as Peacekeeper although there would be more silos in the deployment area.
  - Improved Minuteman III - Marginal. There would be increased public exposure to the missile and warheads due to the additional number of silos and larger deployment area.

POLICY (U)

ARMS CONTROL: (U) Good. This system would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. The system provides leverage

for arms reduction negotiations, and its force effectiveness supports strategic arms reductions. However, the somewhat later IOC of the system would result in less negotiating leverage than other systems.

- **(U) Missile Excursions:**
  - Common Missile - Good. The 1990 IOC may provide reduced leverage for current negotiations.
  - Improved Minuteman III - Good. However, does not provide as much leverage for negotiations as Peacekeeper.

FOREIGN POLICY: (U) Good. Southside basing demonstrates U.S. resolve to modernize strategic forces and, by demonstrating U.S. political will to strengthen the land based leg of the Triad, will help sustain and strengthen key government support for NATO modernization. However, the later IOC of the system could reduce somewhat this influence on NATO nuclear force modernization.

- **(U) Missile Excursions:**
  - Common Missile - Good. The later IOC (1990) may reduce incentive for NATO modernization.
  - Improved Minuteman III - Good. The possibility exists that this alternative would not be perceived as a serious attempt to redress the strategic imbalance.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- Prompt strike capability against hard targets
- High effectiveness against current threat
- Some Soviet attack stress due to lofted attack requirements
- Throw weight flexibility for penaids and/or large yield RVs

NEGATIVE FEATURES: (U)

- Long term threat negates system at relatively low price
- Growth options may be restricted by siting constraints
- Environmental impacts
- Short attack duration

5.2.6 Multiple Protective Shelters

5.2.6 MULTIPLE PROTECTIVE SHELTERS (U)

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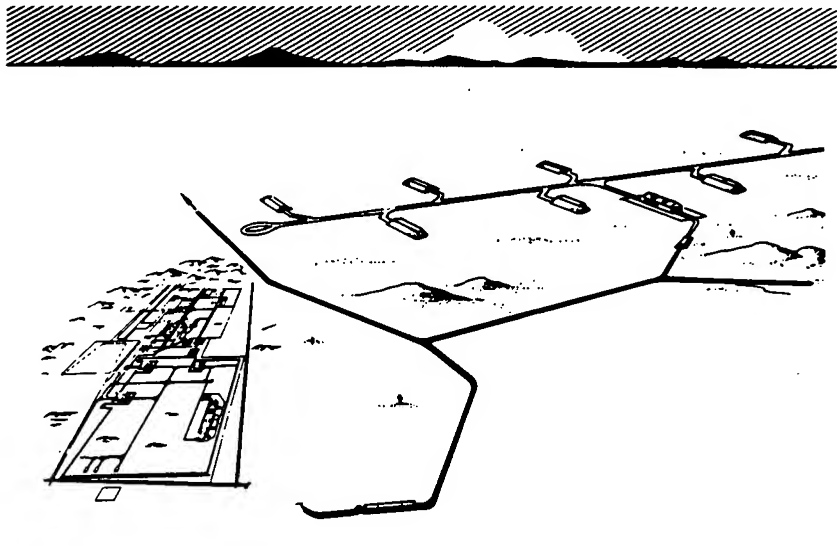


UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 200 Peacekeeper missiles
- 4600 hardened horizontal shelters in separate clusters of 23
- Spacing about 1 mile
- Point security
- Missile location concealment
- Collocated simulator/launcher exchange at shelter

5.2.6.1 Concept (U)

(U) The multiple protective shelter alternative uses proliferation of a large number of shelters and concealment for survivability.

5.2.6.2 Description (U)

(U) The multiple protective shelter system deploys 200 Peacekeeper missile/launchers in 4600 horizontal shelters. The shelters are spaced approximately 5200 feet apart to

force independent targeting of each shelter. The shelters are 172 feet long with 21-inch-thick reinforced concrete walls, and are covered with 3 feet of soil.

(U) The missiles, placed in canisters and mated with an erector/launcher, are concealed during their movements among shelters by a transporter vehicle. The transporter can also carry a simulator that duplicates the characteristics of the missile and can remove or emplace a missile or simulator at each shelter. The system has a capability to relocate the entire force within a few days if a significant disclosure of missile locations occurs.

(U) The multiple protective shelter system would be deployed over a total land area of 8500 square miles, but requires only about 25 square miles (16,000 acres) of restricted-access area. The missile/launchers are assembled in the designated assembly area; and are transported over a single road to clusters of shelters in the deployment area.

5.2.6.3 Technical Assessment (U)

a. Survivability

(U) Multiple protective shelter survivability depends on two factors: the number of Soviet reentry vehicles available to attack and the ability to maintain the concealment of missile locations. The multiple protective shelter concept was originally designed to withstand a constrained attack of 2850 reentry vehicles with 50% U.S. survivors. The remainder of the available Soviet reentry vehicles were allocated to other U.S. targets. Against this design threat, multiple protective shelter survivability is outstanding.

(S) [redacted]

(S) [redacted]

[redacted]

(S) [redacted]

Table 5.2.6-1. (U) MPS Performance for Current and Projected Soviet Attack Excursions

SECRET

Time	Yield (KT) Projected CEP (ft)	No. RVs/ Booster	Number of Survivors With 308 SS-18s Applied (%)		Attack Price to Negate System (SS-18 Equivalents)		Number of RVs Required To Negate System	
			U.S. View	Soviet View	U.S. View	Soviet View	U.S. View	Soviet View
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

SECRET

(S) [redacted]

(S) [redacted]

b. Attack Scenarios (U)

(S) [redacted]

c. **Resiliency to Threat Enhancement (U)**

(U) If the United States deploys a multiple protective shelter system, the Soviets could respond by further fractionating their available intercontinental ballistic missile throw weight capability. There are two options the United States can initially take to counter this Soviet response. First, the number of shelters can be expanded beyond the 4600. Department of Defense analysis indicates that shelters can be built at a cost and rate comparable to Soviet reentry vehicle fractionation. In the absence of arms control constraints, the Soviets could force a very large cost growth in the multiple protective shelter program.

(U). The second option available to counter Soviet fractionation is ballistic missile defense. The system of ballistic missile defense originally proposed for multiple protective shelters was low altitude defense system. The low altitude defense system would use low altitude interceptors and radars which would be concealed similar to the missiles. The interceptors would preferentially defend the Peacekeeper missiles. This would effectively double the leverage since the Soviets would not know the location of either the interceptor or missile. They would have to target two reentry vehicles at every shelter, one to engage the interceptor and the other to attack the shelter. To fully attack the 4600 shelters with low altitude defense system protection would require 9200 reentry vehicles. Combining low altitude defense systems with multiple protective shelter growth would make attack requirements even more demanding. This defense consists of 200-600 mobile interceptors which is incompatible with the Anti-Ballistic Missile Treaty.

d. **Siting/Environment/Public Interests (U)**

(U) Primary siting considerations include depth to rock and water, terrain, population avoidance, minimum parcel size, significant cultural and environmental feature avoidance, and coastline and national border standoff distances. Areas in Nevada/Utah or Texas/New Mexico are potentially suitable for deployment.

(U) Siting flexibility is low because of the limited number of suitable geographic areas. However, confidence in technical feasibility is moderate due to the partial field studies already conducted during multiple protective shelter siting work.

(U) Deployment is expected to be dispersed over 5,440,000 acres, of which 160,000 acres will be permanently disturbed due to shelter construction, access roads, and two new support bases. Approximately 16,000 acres will be fenced and excluded from public access. Operations, maintenance, and support requires about 13,000 people, with peak year employment expected to reach 34,000. In-migration of construction, operations, support personnel, and their families will increase the demand for land, housing, and public services.

(U) The very large number of in-migrants will create very large socioeconomic impacts in areas with low community infrastructures to absorb the additional demands. Economic dislocation, wage inflation, housing shortages, and degradation of public finance is expected.

(U) System layout and construction phasing largely determine the magnitude and location of potential impacts. Siting flexibility eases mitigation by avoidance of biologically and archaeologically sensitive areas. However, the large number of shelters reduces overall flexibility. Also, activities from the large number of in-migrants may substantially disturb sensitive areas.

(U) Suitable land is predominately public, which would have to be withdrawn through congressional action.

(U) Project water requirements for construction of 4600 shelters is very large. In some places domestic and project water requirements are believed to exceed recharge capability. There is the possibility that water would have to be purchased from existing agricultural users. This could potentially remove 2000 acres from irrigated farm use.

(U) The Air Force recognizes that this basing system is expected to have the largest environmental impacts of all the basing alternatives. Substantial efforts toward mitigating expected environmental impacts would be planned.

(U) Public interest issues could include effects of population growth and large land requirements, and competition for resources such as water, labor, materials, and energy during the construction phase.

e. Technical Issues/Risks (U)

(U) The technical risks of building and deploying multiple protective shelters are low. All the technology required is current state-of-the-art. The major technical risk of the program is the capability to maintain missile concealment. Prior to program termination, research and development had progressed to the point of providing high confidence system designs.

f. Arms Control (U)

(U) The multiple protective shelter system would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It also is compatible with Strategic Arms Reduction Talks objectives of reduced forces. Multiple protective shelter provides START negotiating leverage by demonstrating U.S. resolve to modernize and counter Soviet capability that threatens U.S. strategic forces, thus diminishing the utility of large Soviet intercontinental ballistic missile. However, the 1988 initial operational capability of this alternative would result in less negotiating leverage than some other alternatives.

(U) The verification concept for multiple protective shelter provided ample opportunity to effectively verify numbers during assembly and transit to the deployment areas. Once the missile is deployed, the missile access route to the area would be sealed off with barriers that would prevent covert deployment of additional missiles. These barriers would be designed so that if they were disturbed the Soviets could detect it by national technical means.

5.2.6.4 Missile Excursions (U)

(U) None.

5.2.6.5 Summary (U)

(U) The baseline concept of 200 missiles and 4600 shelters provides good survivability against the current threat. This survivability could be maintained against an arms control constrained threat. However, in the absence of constraints on total reentry vehicles, the potential for projected threat growth can overwhelm the baseline system. The United States could respond to threat growth by deploying more shelters and/or by deploying a ballistic missile defense. Sufficiently large expansion of multiple protective shelter could maintain survivability but at large costs.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

ATTACK PRICE (10% SURVIVORS)
(ASSUMES FULL U.S. RIDEOUT) (U)

ATTACK DURATION
(10% SURVIVORS) (U)

SECRET

[redacted]

SECRET

SECRET

[redacted]

SECRET

MILITARY CAPABILITY: (S) [redacted]

SURVIVABILITY: (S) [redacted]

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ENDURANCE: (S) [redacted]

RESILIENCY: (S) [redacted]

Reactive Threat Description	Time Frame	Potential Response
[redacted]	[redacted]	[redacted]

DEFENDABILITY: (U) Good. Non-treaty limited defense is feasible with this basing mode. BMD doubles the Soviet attack price to negate the system.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

R&D	8.7
Production	25.2
Military Construction	15.5
Total Acquisition	49.4
10 Year O&S ($0.766/year)	7.7
Total Life Cycle	57.1

SCHEDULE (U)

	Peacekeeper
Rating	Fair
IOC	1988
FOC	1993

IOC Schedule Constraints (U)

- Basic siting decision is potential constraint.
- Following the basing decision, the environmental impact analyses process paces the start of site specific design and land acquisition.

TECHNICAL RISK: (U) Fair. MPS point security requirements increase risk in countering concealment threats. Validation tests are required.

OPERABILITY/SUPPORTABILITY: (U) Marginal. The concealment requirement and large MPS deployment area necessitate a high investment in manpower, facilities, and support equipment to maintain and operate the system.

SITING: (U) Fair. A limited number of geographic areas have been identified. There are no anticipated problems with constructibility at the proposed areas. Two new support bases are required for the configuration.

ENVIRONMENT: (U) Poor. Large population in-migration to support construction activities and the attendant demands on existing resources in a large region result in very large impacts.

PUBLIC INTERFACE: (U) Marginal. There is frequent public exposure to the weapon system (mated to booster) during transport.

POLICY (U)

ARMS CONTROL: (U) Good. Multiple protective shelter would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment and is designed with measures to facilitate national technical means of verification. Multiple protective structure provides negotiating leverage, however, its later initial operational capability would somewhat reduce this leverage. It is compatible with the START objectives of reduced forces.

FOREIGN POLICY: (U) Good. This alternative enhances U.S. capability and demonstrates U.S. resolve to redress the current strategic imbalance. The multiple protective shelter alternative, by demonstrating U.S. political will to strengthen the land-based leg of the Triad, will help sustain and strengthen key government support for NATO nuclear force modernization; however, the later initial operational capability would lessen this influence on NATO modernization.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- Prompt strike capability against hard targets
- High effectiveness against current threat
- High Soviet attack price

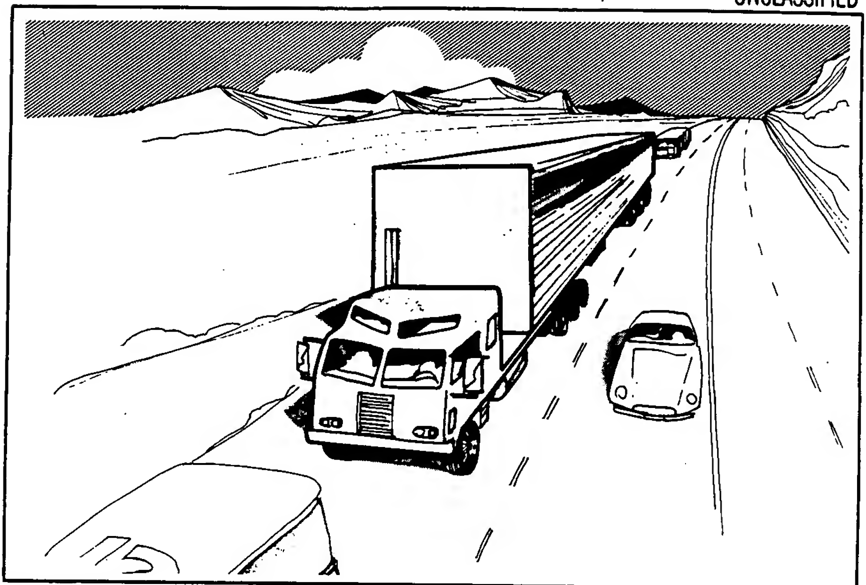
NEGATIVE FEATURES: (U)

- High environmental impact
- High manpower required for concealment, large deployment area, and point security.
- Marginal effectiveness against an unconstrained threat.

5.2.7 Road Mobile -
Soft

5.2.7 ROAD MOBILE - SOFT (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 1000 missiles/trucks
- Continuously mobile
- Small missile, single reentry vehicle
- Airborne/ground security force
- Interstate and secondary roads used

5.2.7.1 Concept (U)

(U) The road mobile concept disperses the intercontinental ballistic missile force throughout the Continental United States. The concept is dependent on mobility, compatibility with public roads, sufficient operational areas, and presurveyed launch points.

5.2.7.2 Description (U)

(U) The road mobile concept uses existing public roads for wide area dispersal of 1000 small missiles. The missile transporters will be configured like commercial tractor-trailers to minimize the hostile agent threat and will travel continuously over primary and secondary roads. The missiles will be launched from any of 10,000 to 20,000 presurveyed launch sites. Security for each missile will be provided by two escort teams, two men per team, with reinforcements provided by a rapid response force.

(U) The small missile described in Section 4.4 is transported by a road legal transporter-erector-launcher. Nuclear security is enhanced by a command disable warhead combined with active delay/denial devices aboard the vehicle.

(U) To reduce the probability that the vehicles can be tracked and locations projected and targeted, they are configured to appear as normal commercial vehicles. Security vehicles are also inconspicuous, and are always within 10 minutes response time of the missile transporter. In case of incident, a security backup team of 15 armed personnel can respond within 45 minutes from one or more of 28 security bases. The transporter incorporates a delay/denial system to ensure security during the time it takes the security forces to arrive.

(U) Crew operations and security forces are located at 28 bases throughout the Continental United States. Ten of the 28 bases will act as main support bases to provide vehicle and missile maintenance. Day-to-day operations consist of continuous travel, with meal and fuel stops. Crews alternate on 12-hour shifts. Vehicle routes are preplanned, with periodic vehicle check-in.

(U) Emergency action message receipt will be via repeater relays aboard all missile transporters. Upon receipt of this message, the vehicle will proceed to a presurveyed site, where the transporter will stabilize, erect, and launch. With the large number of presurveyed sites, a vehicle should be capable of traveling to a site, stabilizing, erecting, and launching within 1 hour. Increasing the number of presurveyed sites or having the guidance system active during travel could reduce this time.

(U) The main difficulties with this system are: continuous exposure of the public to booster and nuclear warhead movement, nuclear weapon security, and operations manpower.

Alternative Concept (U)

(U) An alternate concept consists of deploying 300 missiles on transporters continually on public roads while the remaining force of 700 missiles on transporters is kept on military bases on (garrison) alert. This approach reduces the public exposure to nuclear weapons, system cost and manpower. The majority of the 300 missiles dispersed on public highways would survive a surprise submarine-launched ballistic missile attack but most of the missiles remaining in garrison would be killed by such an attack. Increasing the number of garrisons and placing the alert force at a high level of readiness can improve the survivability against the submarine-launched ballistic missile attack but involves a cost and manning penalty.

(U) To survive an intercontinental ballistic missile attack, the garrisoned force must dash on warning over the public roads. Approximately 6 hours of driving time is required to achieve the full survivability potential of this system, using the 20 operating bases of the baseline system. By increasing the number of garrisons to 200, this driving time could be greatly reduced, but again cost and manning penalties are significant.

(U) A variation involves increasing levels of dispersal in response to increased tension levels. In times of tension, the garrisoned transporters would be dispersed from the 20 operation bases to other locations such as some 200 plus military bases, other government facilities, or Bureau of Land Management land.

5.2.7.3 Technical Assessment (U)

a. Survivability (U)

(U) Road mobile basing of intercontinental ballistic missiles relies on covert or inconspicuous movement over a large geographical area for survival. The soft vehicle (2-4 psi) being mobile generates large area uncertainty, which precludes highly accurate one-on-one targeting attack scenarios.

(S) [redacted]

(U) Because barrage of the total Continental United States may be impractical at best, the Soviets would have to utilize surveillance in an attempt to somewhat localize the mobile targets. Two options could be utilized: satellite, or agent tracking. Low earth orbit satellite surveillance would require a large number of satellites to continuously cover the United States. Synchronous orbit satellite surveillance could reduce these assets to a manageable number but would require a much more advanced technology. Agents based in the Continental United States could also be utilized to track mobile systems but the reliability and transmission of this agent information would be questionable.

(S) [redacted]

(U) Figure 5.2.7-1 shows the equivalent megatonnage required to barrage areas with overpressures of 2 psi. As the area increases, very large yield weapons are required. But when the target can be localized to a small (100 square nautical miles) area, weapon yields on the order of 0.5 to 1.0 megaton could be effective.

(U) Weather and terrain can amplify the kill radius of a given yield. If the surface is dusty or has heat-absorbing properties, similar to those normally found in areas ideally suited for mobile operations (southwest United States), the character of the blast wave could be intensified by the formation of an auxiliary wave, called a "precursor," that would precede the main blast wave. Somewhat related to the condition of the surface are the effects of objects and material picked up by the blast wave. Additional damage could be caused by flying objects such as boulders, rocks, and pebbles, as well as by small particles such as sand and dust. In dusty areas, the blast wave may pick up enough dust to increase dynamic pressure above values normally corresponding to the overpressure in an ideal blast wave. Consequently, the effect on structures which are damaged mainly by dynamic pressure could be correspondingly increased.

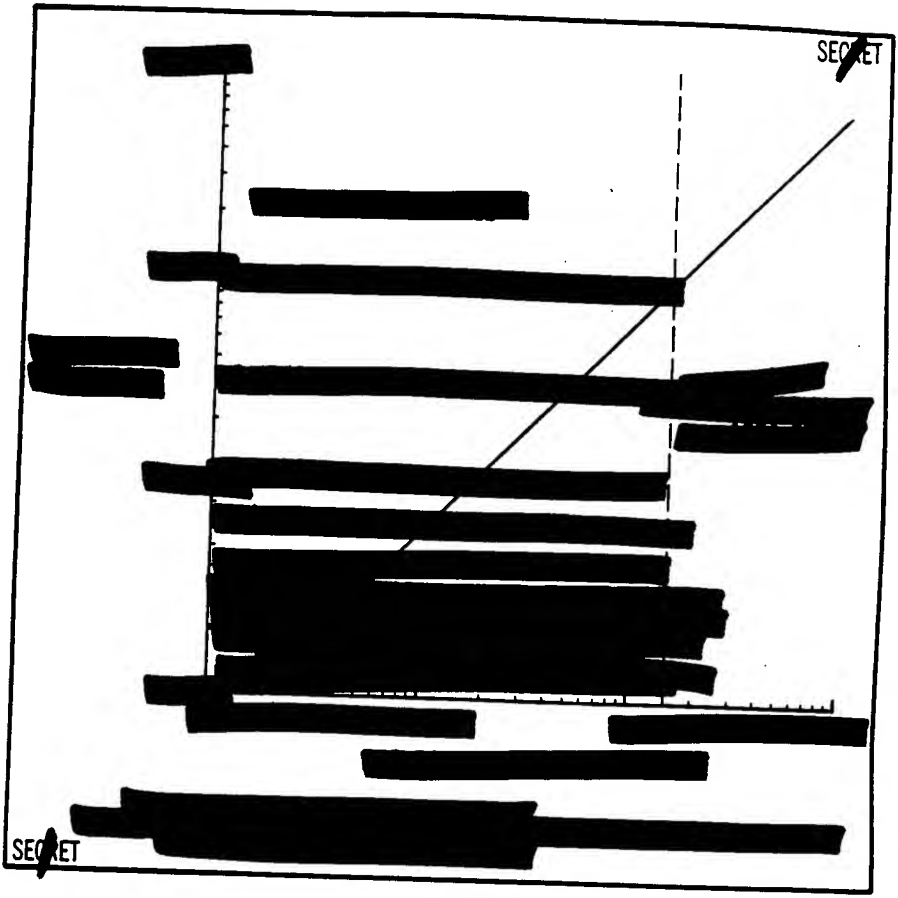


Figure 5.2.7-1. (U) Road Mobile Barrage Attack

(U) The mobile system requires human operators with minimal protection, and the prompt effect of nuclear weapons on man at overpressures must be considered. Figure 5.2.7-2 shows the airblast, thermal, and fallout nuclear radiation effects.

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FORMERLY RESTRICTED DATA

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[redacted]	[redacted]

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	[redacted]		
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[redacted]

[redacted]

[redacted]	EFFECT	
	FIRST DAY	LONG TERM
[redacted]	[redacted]	[redacted]

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FORMERLY RESTRICTED DATA

Figure 5.2.7-2. (U) Effects of Nuclear Detonations on Personnel

SECRET FORMERLY RESTRICTED DATA

(S) [redacted]

(S) [redacted]

Table 5.2.7-1. (U) Road Mobile Survivability Against Projected Threats (1989)

SECRET

Deployment Configuration	Attack	Attack Duration	% Survivors for 308 SS-18s		Total Attack Price to 10% Survivors	
			U.S. View	Soviet View	U.S. View	Soviet View
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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(Line Barrage Considering Influence of Intersections)

Figure 5.2.7-3. (U) Road Mobile - Soft Survivability
(1000 Continuous Mobile Missiles)

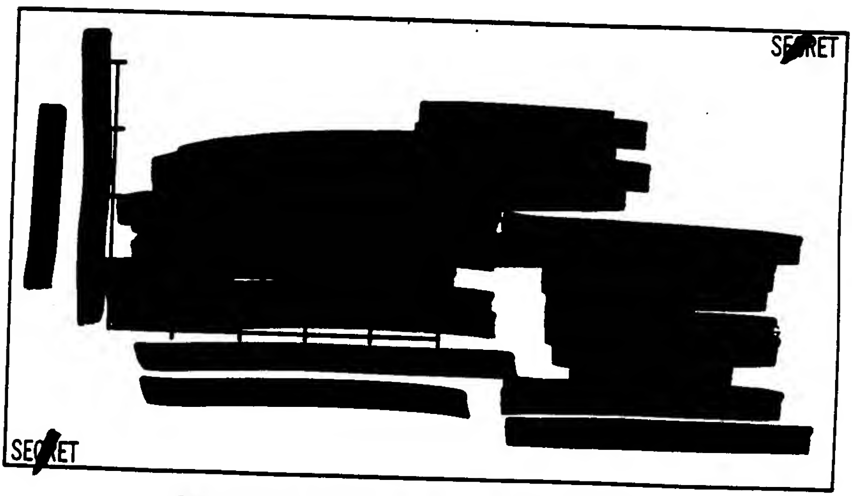

Figure 5.2.7-4. (U) Road Mobile - Soft/Garrison
(300 Missiles mobile - 700 Missiles in Garrison)

b. Attack Scenarios (U)

(U) Several attack scenarios are available to the Soviets, including:

- Intercontinental ballistic missile or submarine-launched ballistic missile total operational area barrage (no knowledge of individual target location).
- Intercontinental ballistic missile or submarine-launched ballistic missile area barrage of localized area (intelligence available on general target location).
- Agent track and attack of individual targets with conventional weapons.
- Submarine-launched ballistic missile preemptive garrison attack.

(S) [redacted]

c. Resiliency to Threat Enhancement (U)

(U) The survivability of these systems can be improved by increasing the land area of deployment, the road miles, and increasing the mobility fraction if less than 100% of the missiles are initially mobile. Defense systems do not appear feasible. The Soviet response to this system will not be limited to simple proliferation of warheads. An attempt could be made to develop techniques for localizing the missiles possibly through the study of operations, using internal intelligence, and combining satellites with enemy agents in the Continental United States. Sabotage could also force the continuous mobile system into a garrisoned mode decreasing the survivability benefits dramatically.

d. Siting/Environment/Public Interest (U)

(U) Primary siting considerations include the avoidance of major population centers, coastline and national border standoff distances, reasonable proximity to potential support bases, and proximity to primary and secondary highways. Several potential siting configurations for this system exist.

(U) Preliminary studies indicate numerous existing road networks. No definite Department of Defense bases have been identified for further study, but the large number of installations would allow flexibility in siting.

(U) Deployment will probably require acquisition of new land for security posts and expansion of existing operational bases. Disturbed land will result from construction of new security posts, new facilities on existing bases, and roads.

(U) At this time, acreage requirements are relatively unknown. Operations, maintenance, and support will require approximately 57,000 personnel, half of whom will be security personnel. There will be an increase of approximately 5000 people at each of the four main bases, 2200 people at each of the 16 operating and security bases, and 200 people at each of the eight security sites. A temporary construction work force is expected during facilities construction at the operations bases and security posts.

(U) Military population at some bases may expand by 50-100%, which may create a large disruption of labor and shortage of housing in the surrounding communities. Demands for public services will substantially increase.

(U) New acreage requirements for expansion are probably small, but expansion in established communities surrounding bases may create large impacts.

(U) Public interest issues could include fuel use and public safety.

e. Technical Issues (U)

(U) The principal technical issue is the concern over placing nuclear weapons on public roads. Public safety and the theft or sabotage of nuclear weapons are the principal components of this issue. The security system requires development along with new security regulations. Also, skilled personnel are required to perform complex operations. Other issues include: prevention of localization by combined agent and satellite operations and achieving sufficient warhead protection on the vehicle within the legal weight and size limits.

f. Arms Control (U)

(U) Although the SALT II protocol would have prohibited deployment of mobile intercontinental ballistic missile launchers, it would have expired in December 1981.

Therefore, mobile missiles would be compatible with provisions of this treaty if it were in effect at the time of deployment.

(U) The road mobile system offers some negotiating leverage by demonstrating U.S. resolve to modernize its strategic forces. However, because reduced accuracy decreases this alternative's ability to counter Soviet threats against U.S. strategic forces, and because this system has a later initial operational capability, it would have less leverage than some other alternatives. The capabilities of the missile to execute our national military strategy would require the U.S. to reevaluate its proposed START ceilings on ballistic missiles. A road mobile system presents substantial verification problems since small mobile systems present incentives for covert deployment and are difficult to monitor. Additional cooperative measures or more intrusive verification measures are necessary to assure effective verification of compliance (i.e., deploy the systems in peacetime at a few main operating bases in garages with viewports).

5.2.7.4 Missile Excursions (U)

(U) The only possible excursion would be the deployment of 350 improved Minuteman III on 350 mobile launchers. A missile description, technical status and technical evaluation is in Section 4.3. An improved Minuteman III would have to undergo major modifications before it could be used in a mobile basing mode. For example, the missile requires structural changes to permit horizontal carriage of solid propellant stages which were originally designed for vertical storage. Other modifications include development of a canister, missile pads, liquid propellant bellows (in the fourth stage), sabot for cold launch capability, guidance set and a warhead configured for mobility.

5.2.7.5 Summary (U)

(U) A road mobile system relinquishes the protection offered by a secure area on a military reservation or a withdrawn parcel of land for sensitive or potentially hazardous operations in the public domain. Drawbacks include its manpower intensive mobile security and safety provisions. A small mobile system offers the opportunity for open road concealment. Significant cost penalties are incurred by operations in large nonsecure areas and loss of inherent multiple independently-targetable reentry vehicle economy. The system does stress Soviet resources by requiring either proliferation of nuclear forces or development of various techniques for localizing the truck.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (~~S~~) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (~~S~~) [redacted]

- **(U) Missile Excursions:**
  - Improved Minuteman III - Good. Although this excursion employs about one third the number of missiles as the baseline, the total land area in which the mobile Minuteman III would be deployed would be the same, thus extracting the same Soviet attack price as the baseline.

ATTACK PRICE (10% SURVIVORS)
(ASSUMES FULL U.S. RIDEOUT) (U)

~~SECRET~~

[redacted]

~~SECRET~~

ATTACK DURATION
(10% SURVIVORS) (U)

~~SECRET~~

[redacted]

~~SECRET~~

MILITARY CAPABILITY: (S) [redacted]

- **(U) Missile Excursion:**
  - Improved Minuteman III - Fair. Same as baseline.

SURVIVABILITY: (S) [redacted]

- **(U) Missile Excursion:**
  - Improved Minuteman III - Outstanding. Same as baseline. Although this excursion would employ only about one third the number of missiles contained in the baseline, the land area in which the mobile Minuteman III would be deployed would be the same, thereby posing the same attack problems for a Soviet planner.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

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ENDURANCE: (U) Fair. The system is designed for weeks of endurance, limited by post-attack logistics and manpower considerations.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Fair. Same as baseline.

RESILIENCY: (U) Outstanding. A high Soviet technology response is required to counter the system.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Outstanding. Same as baseline.

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Reactive Threat Description	Time Frame	Potential Response
Near real-time surveillance technology to determine transporter location.	?	

UNCLASSIFIED

DEFENDABILITY: (U) N/A. Defense has relatively low utility for this alternative and excursion.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

	Small Missile	Improved Minuteman III
R&D	8.0	5.4
Production	25.4	13.6
Military Construction	4.8	4.3
Total Acquisition	38.2	23.3
10 Year O&S ($2.737/year)	27.4	15.2
Total Life Cycle	65.6	38.5

SCHEDULE: (U)

	Small Missile	Improved Minuteman III
Rating	Poor	Poor
IOC	1990	1990
FOC	1995	1993

IOC Schedule Constraints: (U)

Small Missile and Improved Minuteman III (U)

- Basic siting decision is a potential constraint
- Following basing decision, completion of environmental impact analysis process paces start of site specific design and land acquisition
- Availability of warhead for mobile system that meets nuclear surety requirements.
- To meet the above IOC date of 1990 may require waivers of nuclear weapon system safety rules, restrict mobility of missile to military reservations, or require increased security manpower until a special secure warhead (tamper safe) can be produced in 1992.

Small Missile (Only) (U)

- Missile development

TECHNICAL RISK: (U) Fair. A number of technical issues relating to nuclear safety and security exist.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Fair. Same as small missile.

OPERABILITY/SUPPORTABILITY: (U) Poor. The system is difficult to operate, support, and protect (except in garrison mode) due to very large deployment areas, dispersed maintenance facilities, increased spares problems, and a very high manpower requirement.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Poor. The improved Minuteman III excursion consisting of 350 mobile units would be difficult to operate, support and protect; however, with only 350 missiles deployed, this alternative would require less total manpower than the baseline.

SITING: (U) Good. Preliminary investigation indicates there are adequate miles of existing roads to meet requirements. There are approximately 50 potential bases for operation.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Good. Similar to small missile baseline.

ENVIRONMENT: (U) Fair. Overall impacts of this system are considered moderate. However, there may be some significant local impacts at one or more of the 20 installations and connecting highways affected by the system.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Good. Reduced impacts may occur, because fewer mobile units are deployed in this missile excursion compared to the baseline.

PUBLIC INTERFACE: (U) Poor unless garrisoned. Major public safety concerns exist because of the continuous exposure of the mated weapon system on public highways. During transport, the solid rocket motors could, by accident or fire, explode and disperse nuclear materials over a widespread public area.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Poor. Similar to small missile.

POLICY (U)

ARMS CONTROL: (U) Fair. This alternative would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It would require substantial cooperative measures for effective verification and provides reduced leverage for arms reduction negotiation.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Fair. This alternative would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It provides only limited negotiating leverage due to its reduced hard target capability, the later availability of the system, and because it may not be

perceived as a demonstratable U.S. modernization program in the same sense as the other alternatives. Although the larger size and small numbers of Minuteman systems to be deployed would present less of a verification problem than that of the small road mobile option, the Minuteman excursion would still present verification problems. Additional cooperative measures for effective verification will be required.

FOREIGN POLICY: (U) Good. This alternative represents national resolve to modernize our ICBM force. This deployment, closely paralleling NATO nuclear force modernization, will help sustain and strengthen key government support for NATO modernization. However, the later initial operational capability of the system could lessen this influence on NATO nuclear force modernization.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Good. Same as baseline.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- Good effectiveness against Soviet threat
- High survivability
- Resiliency to projected and reactive threats

NEGATIVE FEATURES: (U)

- Frequent public exposure to weapon system on public highways, unless garrisoned during peacetime
- Technical risk in safety and security unless garrisoned
- Operations and support difficult
- No near term availability
- Manpower intensive
- No throw weight flexibility
- Requires external position data for accuracy

Hard

5.2.8 ROAD MOBILE - HARD (U)

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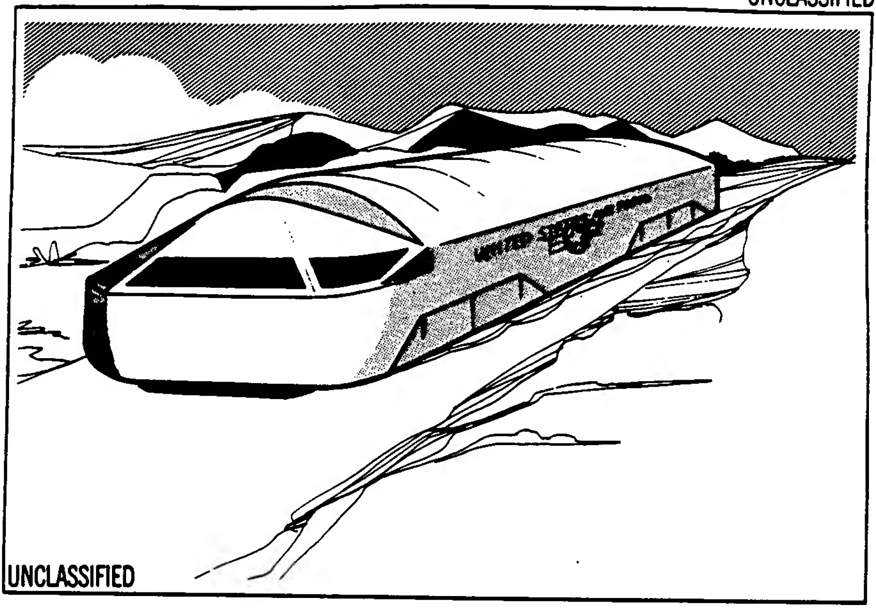

(U) SIGNIFICANT FEATURES

- 1000 missiles
  - One Mark 21 reentry vehicle
  - 34,000 pounds
  - Advanced low power guidance
- Warning required, greater than 30 minutes
- Dash required, up to 15 miles
- Hardened missile transporter launcher - contains one missile
- Random movement on military bases
- Responsive security force

5.2.8.1 Concept (U)

(S) [redacted]

[redacted]

(U) This deployment area must be large enough to provide survivability against preemptive submarine-launched ballistic missile attack. Against an intercontinental ballistic missile attack, larger areas are required to achieve survivability. A warning of greater than 30 minutes is required to have sufficient time for most of the transporters to "dash" from their normal peacetime deployment area to additional areas to provide for survivability. These additional areas would be located both on the military bases and along roads immediately adjacent to the bases.

5.2.8.2 Description (U)

(S) [redacted]

Alternative Concept (U)

(U) An alternative concept would not dash off the base in response to warning. It would be restricted to the base and be randomly dispersed over this area. The on base operations would eliminate the potential problems of public interface which would be expected in planning for defense activities outside the boundaries of existing Department of Defense land. This alternative reduces the land area available for operating the hardened transporters, which significantly reduces the overall survivability.

5.2.8.3 Technical Assessment (U)

a. Survivability (U)

(S) [redacted]

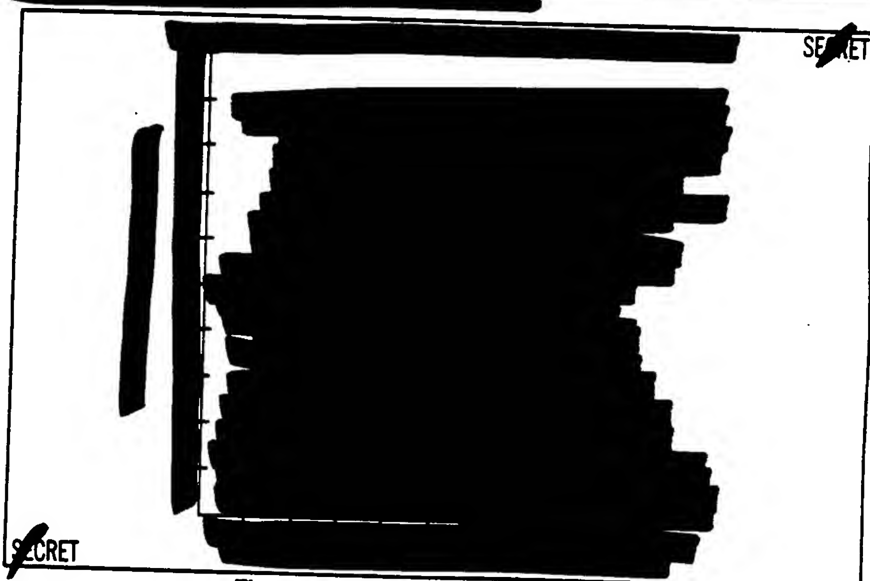

Figure 5.2.8-1. (U) Hardened Road Mobile

Table 5.2.8-1. (U) Department of Defense Installations Area

UNCLASSIFIED

DOD Reservation	Approximate Total Area (Square Miles)	Estimated Technically Suitable Area* (Square Miles)
White Sands Missile Range (New Mexico)	3,500	2,300
Fort Bliss (Texas/New Mexico)	1,800	1,500
Luke Air Force Range (Arizona)	4,200	3,500
Yuma Proving Grounds (Arizona)	1,650	850
Nellis Air Force Range (Nevada)	4,700	2,850
China Lake/Fort Irwin (California)	2,750	1,000
TOTAL AREA	18,600	12,000

*Less than 10% slope, suitable for construction of dirt or gravel roads. Does not include considerations of compatibility with existing Department of Defense Missions.

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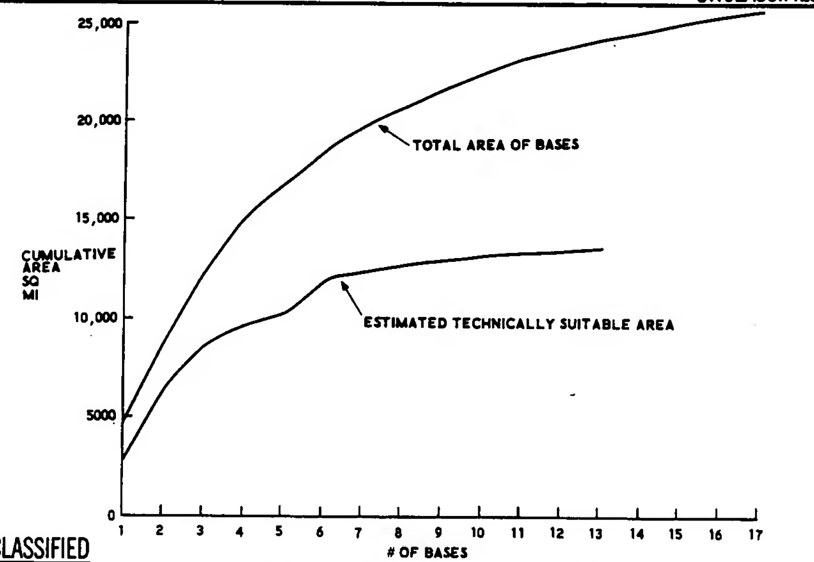
UNCLASSIFIED



UNCLASSIFIED

Figure 5.2.8-2. (U) Military Installation Area

(U) Soft command centers located on base provide peacetime status and control. Command, control, and communications is provided to the missile transporters through ultra-high frequency radio or MILSTAR using ultra-high frequency and extremely-high frequency. The transporter launch capability is augmented by the airborne launch control centers and the ground launch control centers.

(S) [redacted]

(S) [redacted]

b. **Attack Scenarios (U)**

(S) [redacted]

- (S) [redacted]
- (S) [redacted]
- (S) [redacted]

SECRET

Table 5.2.8-2. (U) Hard Road Mobile Survivability Against Projected Threats (1989)

SECRET

Deployment Configuration	Attack	Attack Duration	Survivors for 308 SS-18s		No. SS-18 Equivalents to Negate System	
			U.S. View	Soviet View	U.S. View	Soviet View
[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	
[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	

SECRET

(S) [redacted]

SECRET

[redacted]

c. **Resiliency to Threat Enhancement (U)**

(U) Possible responses to threat proliferation are: increased dispersal of the transporters, deploying on additional existing bases as well as new bases, and defense. These responses are within U.S. technology capabilities.

d. **Siting/Environment/Public Interests (U)**

(U) Primary siting considerations include the availability of sufficient suitable land on existing military installations where weather conditions permit efficient year-round movement of the hardened transporters. Technically suitable land is defined as an area with acceptable terrain slopes, capable of having prepared surface roads constructed. Consideration must also be given to impacts on existing and planned missions on the installations, including the type and severity of the impact. The following six installations have been identified as technically suitable for deployment of this system: White Sands Missile Range, New Mexico; Fort Bliss, Texas; Luke Air Force Range, Arizona; Yuma Proving Grounds, Arizona; Nellis Air Force Range, Nevada; and China Lake Naval Weapons Center/Fort Irwin, California. The cumulative technically suitable acreage of the six installations is insufficient for system deployment, therefore additional adjacent land areas are required for dash. Access to areas immediately adjacent to these installation up to 30 miles from existing range boundaries would be required. Joint-use would impact existing missions at the six installations, requiring major mission activity alterations. The uncertainty in joint-use compatibility creates low confidence in the ability to field the system without major mission impacts at these bases. Limited land availability restricts siting flexibility.

(U) Deployment will necessitate changes in land use. Permanently disturbed land will result from construction of over 2000 miles of new roads, upgrade of over 8000 miles of existing roads, new facilities for operations and maintenance of the missile and transporter, and new personnel support facilities.

(U) Operations, maintenance, and support will require 7000 to 9000 people at each base. A temporary work force is expected at each base during road and facility construction. In-migration of construction, operations, and support personnel and their families will substantially increase demand for land, housing, and public services in the surrounding communities. Since the majority would be military personnel, substantial facility expansion at existing installations will be required.

(U) Short-term project-related and domestic water requirements would be high. Available water supplies are very limited in the arid southwest and there will probably be hydrologic and legal constraints on new appropriations.

(U) Most of the installations are biologically and/or archaeologically very sensitive and impacts could be very large. Luke Air Force Base, Yuma Proving Grounds, and Nellis Air Force Range have many threatened and endangered species habitats. Flexibility in routing the roads could allow mitigation-by-avoidance, but substantial field work would be required. The areas are crisscrossed with trade and travel trails, their associated campsites, and settlement areas. New road networks would need substantial siting preparation.

(U) Public interest issues could include the effects of population growth, fuel use, and competition for resources such as water and construction materials.

e. **Technical Issues/Risk (U)**

(U) The technical risks for hard road mobile are centered around the development of a 30 pounds per square inch vehicle that can operate at speeds greater than 30 miles per hour, and maintain high reliability. With the large number of vehicles, reliability is a major consideration to keep missiles with their transporters on alert. Reliance on strategic warning to initiate dash is also a major concern due to the direct relationship to survivability.

f. Arms Control (U)

(U) Although the SALT II protocol would have prohibited deployment of mobile intercontinental ballistic missile launchers, it would have expired in December 1981. Therefore, mobile missiles would be compatible with provisions of this treaty if it were in effect at the time of deployment.

(U) The road mobile system offers some negotiating leverage by demonstrating U.S. resolve to modernize its strategic forces. However, because reduced accuracy decreases this alternative's ability to counter Soviet capability to threaten U.S. strategic forces, and because this system has a later initial operational capability, it would have less leverage than some other alternatives. However, the capabilities of the missile to execute our national military strategy would require the U.S. to reevaluate its proposed START ceilings on ballistic missiles. A road mobile system presents substantial verification problems since small mobile systems present incentives for covert deployment and are difficult to monitor. Additional cooperative measures or more intrusive verification measures are necessary to assure effective verification of compliance (i.e., deploy the systems in peacetime at a few main operating bases in garages with viewports).

5.2.8.4 Missile Excursions (U)

(U) The only possible excursion would be improved Minuteman III. A missile description, technical status and technical evaluation is in Section 4.3. Details on this system in a mobile configuration can be found in Section 5.2.7.4.

5.2.8.5 Summary (U)

(S) [redacted]

(b) [redacted]

PERFORMANCE EVALUATION (U)

<u>ATTACK SCENARIO:</u> [redacted]

STRATEGIC CAPABILITY (U)

<u>DETERRENCE:</u> (S) [redacted]

- **(U) Missile Excursions:**
  - Improved Minuteman III - Good. Although this excursion employs about one third the number of missiles as the baseline, the total land area in which the mobile Minuteman III would be deployed would be the same, thus extracting the same Soviet attack price as the baseline.

ATTACK PRICE (10% SURVIVORS)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ATTACK DURATION
(10% SURVIVORS) (U)

SECRET

[redacted]

SECRET

MILITARY CAPABILITY: (S) [redacted]

- (U) **Missile Excursion:**

  - Improved Minuteman III - Fair. Same as baseline.

SURVIVABILITY: (S) [redacted]

[redacted]

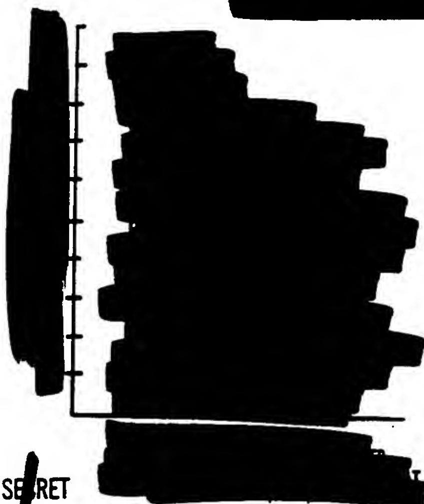
- (U) **Missile Excursion:**

  - Improved Minuteman III - Outstanding. Same as baseline. Although this excursion would employ only about one third the number of missiles contained in the baseline, the land area in which the mobile Minuteman III would be deployed would be the same as the baseline, thereby posing the same attack problems for a Soviet planner.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]



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ENDURANCE: (S) [redacted]

- (U) **Missile Excursions**

  - Improved Minuteman III - Fair. Similar to baseline.

RESILIENCY: (U) Good. This system has high survivability and growth options to respond to Soviet threat growth.

- (U) **Missile Excursions**

  - Improved Minuteman III - Good. Similar to baseline.

UNCLASSIFIED

Reactive Threat Description	Time Frame	Potential Response
Near real-time surveillance technology to determine transporter location	mid 1990s	Increase number of transporters and deployment area
Increased collection activity	late 1980s	Expanded OPSEC/ COMSEC procedures

UNCLASSIFIED

DEFENDABILITY: (U) Fair. This system could be compatible with a defense system using either point or area defense with deployment inside or outside the principal operating bases. Defense could reduce the required area by as much as 50% or increase the attack price for each wave of reentry vehicles engaged. Defense of this alternative would require mobile components and inventory levels which are not compatible with the Anti-Ballistic Missile Treaty.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Fair. Similar to baseline.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)	Small Missile	Improved Minuteman III
R&D	8.3	6.0
Production	33.5	18.1
Military Construction	7.7	7.0
Total Acquisition	49.5	31.1
10 Year O&S ($2.38/year)	23.8	10.2
Total Life Cycle	73.3	41.3

SCHEDULE: (U)	Small Missile	Improved Minuteman III
Rating	Poor	Poor
IOC	1990	1990
FOC	1995	1993

(U) IOC Schedule Constraints:

Small Missile and Improved Minuteman III (U)

- Basic siting decision is a potential constraint
- Following basing decision, completion of environmental impact analysis process paces start of site specific design and land acquisition
- Development of a hard mobile transporter.
- Resolution of mission conflicts at the proposed bases.
- May require waivers of nuclear weapon system safety rules, restriction of the transporters to the military reservations, or increased security manpower until a special secure warhead (tamper safe) could be available in 1992.

Small Missile (only) (U)

- Missile development

TECHNICAL RISK: (U) Fair. The technical risks for hard road mobile are centered around the development of a 30 psi vehicle that can operate at speeds greater than 30 miles per hour, and maintain high reliability. Hardness below 30 pounds per square inch significantly increases the area required. With the large number of vehicles, reliability is a major consideration to keep missiles with their transporters on alert. Reliance on strategic warning to initiate dash is also a major concern due to the direct relationship to survivability.

- **(U) Missile Excursion:**
  - Improved Minuteman III - Fair. Similar to baseline.

OPERABILITY/SUPPORTABILITY: (U) Marginal. Peacetime operations are entirely within military bases but require fairly large manpower levels. Random mobility requires high maintenance and logistics support. Many skilled personnel are required to conduct the 24-hour operation of the missile transporter, communications, and security equipment. Maintaining operations, road quality, and security during poor weather places additional demands on personnel and equipment. Large numbers of missiles and transporters impact facility space, test, and repair equipment, and depot support requirements.

- **(U) Missile Excursion:**

  - Improved Minuteman III - Fair. Similar to baseline but magnitude of efforts would be reduced somewhat because fewer missiles would be deployed.

<u>SITING:</u> (U) Marginal. Limited availability of year-round sites with suitable terrain, and probable conflicts in joint-use of mission areas restrict siting flexibility.

- **(U) Missile Excursion:**

  - Improved Minuteman III - Fair. Siting flexibility would be enhanced due to a significant reduction in the number of missiles to be deployed.

<u>ENVIRONMENT:</u> (U) Marginal. Disturbed land areas for new roads and facilities create very large impacts on sensitive biological and cultural resources. Project related and domestic water requirements of in-migration create large impacts on water resources in arid regions.

- **(U) Missile Excursion:**

  - Improved Minuteman III - Fair. Expected overall impacts will probably be less due to reductions in operations and support requirements. Manpower requirements, in-migration and impacts on water resources should not be as high as with the baseline.

<u>PUBLIC INTERFACE:</u> (U) Fair. Peacetime operation on military installations minimizes public exposure. However, exposure to the public during increased readiness conditions results in this rating of fair.

- **(U) Missile Excursion:**

  - Improved Minuteman III - Fair. Same as baseline.

POLICY (U)

<u>ARMS CONTROL:</u> (U) Fair. This system would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. The system provides reduced leverage for arms reduction negotiations. It requires additional cooperative measures to assure effective verification.

- **(U) Missile Excursion:**

  - Improved Minuteman III - Fair. This alternative would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It provides only limited negotiating leverage due to its reduced hard target capability, the later availability of the system, and because it may not be perceived as a demonstratable U.S. modernization program in the same sense as the other alternatives. Although the larger size and small numbers of Minuteman systems to be deployed would present less of a verification problem than that of the small road mobile alternative, the Minuteman excursion would still present verification problems. Additional cooperative measures for effective verification will be required.

FOREIGN POLICY: (U) Good. This alternative represents national resolve to modernize our intercontinental ballistic missile force and reestablish the strategic balance. It will also help sustain and strengthen key government support for NATO nuclear force modernization. However, the later initial operational capability of the system would lessen this influence on NATO nuclear force modernization.

- **(U) Missile Excursion:**

  - Improved Minuteman III - Good. Same as baseline.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

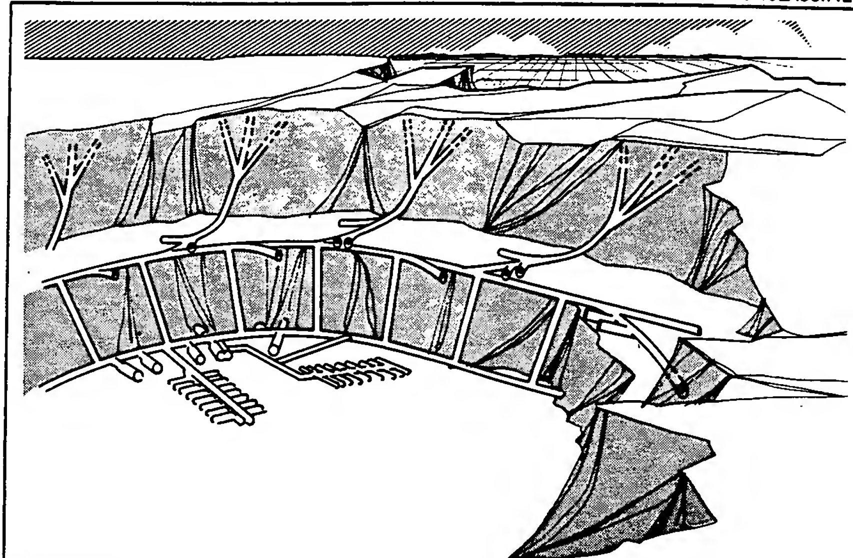
- High survivability with sufficient warning and land area

NEGATIVE FEATURES: (U)

- Requires large portions of land
- Technical risk associated with achieving transporter hardness
- No near term availability (1990 IOC)
- Requires warning
- No throw weight flexibility
- Manpower intensive
- Requires external position data for accuracy

5.2.9 DEEP BASING (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 100 Peacekeeper missiles
- Bi-level underground facility
- Upper level - missile launch nodes
- Potential for use as alternate NMCC
- Lower level - support center
- Multiple inclined egress shafts
- Self-sufficient, post-attack

5.2.9.1 Concept (U)

(U) The deep basing system consists of Peacekeeper missiles, facilities, and support equipment based at sufficient depth below the ground surface and with appropriate separation of critical resources for survival. A system goal is to provide system endurance and operational capability of at least one year after an attack. Provisions could also be designed into the system to allow its use as an alternate National Military Command Center (NMCC).

(U) To optimize hardness and cost, assets are placed at two different depths. An upper level contains the canisterized missiles, transporter/erector/launcher and egress subsystems, and necessary support required for egress and launch operations. The lower level contains the launch control center, operations center, maintenance center, personnel accommodations, and power, environmental control, and life support elements for long-term endurance.

(U) Preattack maintenance is performed in a controlled environment, and is limited primarily to periodic maintenance of dormant operational equipment. Excellent trans- and post-attack maintenance capability is achieved with sufficient spares provided on the lower level to support organizational level maintenance for missiles and support equipment throughout the endurance period.

(U) Key issues include survivable, enduring communications and technology for missile egress upon receipt of a launch command.

5.2.9.2 Description (U)

(U) For the baseline system there are 10 support centers and 100 launch nodes. Each support center is connected to each of its 10 supported launch nodes with a shaft. Upper level facilities are located adjacent to the site periphery and are interconnected by a tunnel network. Lower level support centers are located toward the site center away from the missile launch nodes, and are also interconnected by a tunnel network. All support centers and electrical power subsystems are interconnected so that a single center can provide egress and launch control of any missile within the complex.

(U) Each launch node contains the required facilities, support equipment, and consumables to support egress excavation and launch for more than one missile. A horizontal primary egress tunnel originates from the upper-level connector tunnel at each launch node, adjacent to which are stored missiles and support elements. The primary egress tunnel branches into three secondary egress tunnels, which are inclined at an approximate 45-degree angle toward the surface. The secondary egress tunnel is designed to be progressively harder as it nears the surface, until hardening is no longer practical. Above this point, the tunnels are pre-dug and backfilled to within several hundred feet of the surface in order to provide a quicker launch egress.

(U) A pit is located near the termination of the primary egress tunnel for storage of the material generated by the egress excavation process. The interconnecting tunnel, primary egress tunnels, material pits, and equipment storage alcoves are hardened against nuclear weapon effects. As a protection against internal agent attacks, each support center/launch node cluster is isolated from the other clusters by blast doors and chemical-biological protective seals.

(U) Two major technical issues must be resolved prior to a decision to proceed to the full-scale development phase. First, a survivable post-attack egress concept must be developed. Second, survivable post-attack command, control, and communication links must be developed.

5.2.9.3 Technical Assessment (U)

a. Survivability (U)

(U) Deep basing achieves survivability through the use of depth of burial and redundancy of underground assets, and hardening of tunnels and facilities.

(U) Deep burial forces a large vertical miss-distance upon the attacker. This results in greatly reduced nuclear environments at the launch facility because of the attenuation by the geological overburden. In addition, deep burial depth makes in-place survivability insensitive to accuracy improvements of attacking weapons.

(U) Redundancy of underground assets, including both missiles and support facilities, complicates the Soviet targeting problem and ensures the operability of the deep-based system. The underground tunnel systems present him with a line target, the destruction of any part of which does not significantly impair the operation of the deep-based facility. In addition, the redundancy of support facilities, missile, egress tunnels, and other assets ensures facility survival and operability against even a massive nuclear attack.

(U) Most tunnels will be minimally hardened to facilitate construction and reduce cost. Egress shafts can be hardened and backfilled to enhance survivability and minimize digout time. Critical areas, such as those for power and communications, can be additionally hardened against nuclear weapon effects to ensure their survivability.

(S) [redacted]

b. Attack Scenario (U)

(S) [redacted]

c. Resiliency to Threat Enhancement (U)

(S) [redacted]

(S) [redacted]

d. Siting/Environment/Public Interests (U)

(U) Primary siting considerations include soil seismic velocities, vertical rock thickness and compressive strength, groundwater drainage, minimum parcel size, geologic strata, significant environmental and cultural feature avoidance, and coastline and national border standoff distances. Twelve areas have been preliminarily identified as suitable for potential deployment in the states of Colorado, Utah, Nevada, Wyoming, and Idaho.

(U) However, among those 12 areas there is considerable geologic uncertainty. There have been no field studies at depths of interest for this basing mode. Geologic surveys of the areas are being planned, but until they are completed, confidence in the geotechnical suitability of the various sites is low. Conventional tunnel construction is planned, but underground construction of this magnitude has never been done. Egress and system support techniques are currently being studied.

(U) Deployment requires approximately 64,000 acres for deep tunnels, but only 7,100 acres for portals and an operating base. Disturbed acreage is expected to be 9,000 acres due to construction roads, spoils piles, and an operating base. Operations, maintenance, and support requires about 11,500 people, with peak year employment expected to reach 16,000 during the construction period. In-migration of construction, operations, support personnel and their families will increase demand for land, housing, and public services. Socioeconomic impacts will be large since most sites are located in rural areas with low support capabilities. Significant biological disturbance would result from spoils disposal, project land disturbance, and recreation-related activities of in-migrants. Possible hydrologic impacts unique to deep basing include alteration of groundwater flow, water level declines, and deterioration of water quality as a result of tunneling activities and wasterock disposal. The topographic situation is sensitive to archaeological and historical sites.

(U) Public intrest issues could include the scale of construction in a generally rural area, water requirements, potential impacts on water quality, and spoils disposal from mining during tunneling operations.

e. Technical Issues/Risk (U)

(U) Technology exists (Table 5.2.9-1) to address most aspects of design, construction, and operation of a deep-based Peacekeeper system. The mining and tunneling industries, underground operations of commercial enterprises; military installations, submarine and space vehicle operations, the operation of current missile systems; and the instrumentation and performance of underground nuclear tests are providing answers to concerns relative to a deep-based system.

(U) The deep-based Peacekeeper system is of a larger scale than any existing underground project, but experience exists for this kind of construction. Mines, subways, aqueducts, the Chicago storm water system, and the Cheyenne Mountain Complex all provide experience that indicates the deep-based system can be constructed. The ease and speed with which construction can take place depends upon the geological features of the construction site.

Table 5.2.9-1. (U) Required Technology Existing for Deep Basing

UNCLASSIFIED

Requirement	Experience
Major underground excavation and construction; muck handling and disposal	Mines; civil and commercial tunneling
Routine and prolonged crew confinement	Mines, NORAD, alternate National Military Command Control Center, submarines, space vehicles
Air cooling, conditioning, and cleaning	Mines, submarines, space vehicles
Megawatt-size fuel cells	Department of Energy, CON ED, UTC demonstration in NYC
Waste heat disposal	NORAD, alternate National Military Command Control Center
Definition of attack environment survivable rock opening	Underground nuclear tests
Shock isolation	Minuteman, ships, submarines
Through-earth communications	Mine rescue, underground test data telemetry, Sanguine

UNCLASSIFIED

(U) The underground support systems for the deep base must provide power, environmental control, and life support. The systems use both surface and subsurface equipment to provide the necessary support functions. Surface equipment would provide peacetime power, air, and environmental control, and would transfer all operations to the below-ground mode in a crisis. There are several options for power in this mode: fuel

cells, nuclear reactors, and closed-cycle engines. A key issue, though, is heat dissipation from power generation. The environmental control and life support systems condition and cool the air, protect the facility from such dangers as chemical/biological weapons or fire, and provide facilities to ensure the health and welfare of the crew. Experience exists in all of these areas in the operation of underground facilities and submarines, but not on the scale required for the deep-based Peacekeeper system.

(U) The primary issue in deep-basing development is feasibility of egress excavation through fractured or rubblized rock at acceptable rates. Secondary egress excavation issues are: ground stabilization to preclude cave-in, remote control or automation, and the feasibility of pre-dug and backfilled tunnels. Egress demonstrations by Air Force contractors are scheduled during 1983 to ascertain the feasibility of egress through rubble.

(U) Two-way post-attack communication with higher authority is a significant issue. There are currently three approaches to this problem, two of which, air-dropped and ground-placed reconstitution of surface receiver/transmitter stations (relays), rely upon through-earth communications for transmission from the deep base to the surface relay station. The third, a boreout relay station, uses a fiber optic link to the deep base. Preliminary results of through-earth communication tests conducted in New Mexico and at the Nevada Test Site indicate data transmission rates of 3 to 10 bits per second at power levels ranging from 10 to 100 kilowatts, both considered to be acceptable for post-attack communication.

f. Arms Control (U)

(U) Deep basing would be compatible with provisions of SALT I and/or SALT II if either were in effect at the time of deployment since it is a new basing mode not accounted for under that treaty. Moreover, this concept does not entail the construction of new additional fixed intercontinental ballistic missile launchers.

(U) Deep basing is compatible with the goal of reduced forces since it provides additional force effectiveness. Deep basing provides negotiating incentive for the Soviets due to the demonstration of U.S. resolve to modernize and counter Soviet capability which threatens U.S. strategic forces. However, the later initial operational capability of the

system would lessen its contribution to negotiating leverage in current arms negotiations. This option would provide less negotiating leverage than more prompt basing modes.

5.2.9.4 Missile Excursions (U)

(U) Small Missile - For this excursion, 1000 small missiles would be deployed in an underground complex(es). Details of the missile are discussed in Section 4.4, and the system excursion is discussed within the following evaluation summary.

5.2.9.5 Summary (U)

(U) Deep basing can contribute the following unique elements to the intercontinental ballistic missile force:

- Very high effectiveness against current and projected national intelligence estimate threats
- Very long-term endurance (months of duration)
- Resilience to responsive threats
- Potential for use as an alternate NMCC

(U) Due to the inability of the attacker to determine with confidence the probable survivability levels of a deep-based site and to monitor the progress and success of an attack, he has a low level of confidence in ensuring system kill. This attribute appears to be a major benefit in deployment of a deep-based system.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (U) Good. This system is believed to be very survivable and not easily attackable which leads to the good rating in this factor. However, this alternative does not provide a prompt retaliatory capability.

- (U) Missile Excursion:
  - Small Missile - Good. Similar to Peacekeeper baseline.

ATTACK PRICE (10% SURVIVORS)	ATTACK DURATION (10% SURVIVORS)
UNCLASSIFIED	UNCLASSIFIED
(U) The deep basing system cannot be easily attacked with current weapon systems	N/A
UNCLASSIFIED	UNCLASSIFIED

MILITARY CAPABILITY: (S) [redacted]

- (U) Missile Excursion: Fair. Similar to Peacekeeper baseline.

SURVIVABILITY: (U) Outstanding. The deep basing system cannot be easily attacked.

- **(U) Missile Excursion:** Outstanding. Similar to Peacekeeper baseline.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ENDURANCE: (S) [redacted]

- **(U) Missile Excursion:** Outstanding. Similar to Peacekeeper baseline.

RESILIENCY: (U) Outstanding. New technologies are potentially required to negate the system. Growth opportunities include deeper vaults within the original system or additional facilities.

- **(U) Missile Excursion:** Outstanding. Similar to Peacekeeper baseline.

SECRET

Reactive Threat Description	Time Frame	Potential Response
[redacted]	[redacted]	[redacted]

SECRET

DEFENDABILITY: (U) N/A. There is no need to defend the deep basing launch complex because of its outstanding survivability.

- **(U) Missile Excursion:** N/A. Similar to Peacekeeper baseline.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

	Peacekeeper	Small Missile
R&D	13.0	13.0
Production	19.0	40.1
Military Construction	28.0	26.9
Total Acquisition	60.0	80.0
10 Year O&S	4.2	5.6
Total Life Cycle	64.2	85.6

SCHEDULE: (U)

	Peacekeeper	Small Missile
Rating	Poor	Poor
IOC	1991	1991
FOC	1997	2000

IOC Schedule Constraints: (U)

(U) Peacekeeper and Small Missile

- Basic siting decision
- Following basing decision, completion of environmental impact process paces site specific design and land acquisition.
- Construction delays due to geotechnical uncertainties.

TECHNICAL RISK: (U) Fair. Geotechnical and Egress issues exist for this system. Development tests currently in process have the potential to significantly reduce this risk assessment in the near term. The egress requirements stress current mining technology.

- **(U) Missile Excursion:**
  - Small Missile - Fair. Similar to Peacekeeper baseline.

OPERABILITY/SUPPORTABILITY: (U) Fair. New procedures and equipment are required. However, access to the missile system is good.

- **(U) Missile Excursion:**
  - Small Missile - Marginal. The increased number of missiles require additional manpower and equipment. Costs to operate and support this system are expected to be higher than the baseline.

SITING: (U) Fair. There are twelve areas under consideration for this configuration. Extensive construction is required for the underground facilities and tunnel depths of 2000 feet or greater. Geotechnical concerns exist at each potential area due to lack of data at the proposed depths. A new operating base will be required.

- **(U) Missile Excursion:**
  - Small Missile - Marginal. Construction of tunnels for small missiles is easier than for Peacekeeper missiles. However, more missiles require more space and significantly limit siting flexibility. This excursion may require two or more bases.

ENVIRONMENT: (U) Marginal. This system impinges on remote areas with insufficient local capability to support the large personnel in-migration required for construction and operation of a new support base and extensive underground facilities. Large impacts are projected during the construction period in socioeconomics, biology, water resources and cultural resources, with low impacts on land use and moderate impacts on air quality.

- **(U) Missile Excursion:**
  - Small Missile - Marginal. Similar to baseline.

PUBLIC INTERFACE: (U) Good. Although there is no public exposure to the nuclear weapon system when in the confines of the support base or in the deep underground complex, there is some public exposure when the weapon system is transported from the support base to its underground complex over public roads.

- **(U) Missile Excursion:**
  - Small Missile - Good. Similar to baseline.

POLICY (U)

ARMS CONTROL: (U) Good. It would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It also would provide negotiating leverage and support the U.S. START objective of significant military reductions. However, the later IOC of the system would reduce this leverage in current negotiations. New verification techniques may be required.

- **(U) Missile Excursion:**
  - Small Missile - Good. Similar to baseline.

FOREIGN POLICY: (U) Good. Deep basing, by demonstrating U.S. political will to strengthen the land based leg of the Triad, will help sustain and strengthen key government support for NATO modernization. However, the later IOC of the system could lessen this influence on current NATO nuclear force modernization.

- **(U) Missile Excursion:**
  - Small Missile - Good. Similar to baseline.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- High effectiveness against current and projected threat
- High Soviet price to negate system
- Very long endurance
- No public exposure to weapon system with nuclear weapons mated
- Resilient
- Low attack confidence
- Requires the Soviets to replace "small" MIRVs with larger reentry vehicles, thus decreasing Soviet warhead inventory and targeting flexibility
- Throw weight flexibility for penaids and large yield RVs
- Potential for alternate NMCC

NEGATIVE FEATURES: (U)

- Limited prompt response capability
- Large environmental impacts
- Egress demonstration has not yet proven system feasibility
- Schedule

5.2.10 Minuteman Silos -
Peacekeeper

d. Siting/Environment/Public Interests (U)

(U) Primary siting considerations include depth to rock and water, operations impacts, and command and control effectiveness. All six Minuteman wings were considered using these criteria and proposed deployment would be in Minuteman Wing V at F. E. Warren Air Force Base, Wyoming. One hundred of the Peacekeeper missiles would displace Minuteman III missiles in two of the four squadrons.

(U) Wing V at F. E. Warren Air Force Base was selected because it required minimum silo modification, and much of the siting and engineering work was already done. Construction is limited to silo modification and facility work, so there is high confidence in the geotechnical feasibility and constructibility of this basing mode.

(U) Deployment will permanently disturb about 50 acres to enlarge turning radii of access roads. Operations and maintenance requires about 350 additional people with a temporary workforce expected during modifications. Temporary housing demands will increase, as will short-term demands on public services. Impacts on biologically sensitive areas are expected to be low and avoidable. Land is required only for easements without restricting public access.

(U) No major public interest issues are apparent.

e. Technical Issues (U)

(U) No significant technical issues for the feasibility of deployment exist.

f. Arms Control (U)

(U) The Peacekeeper missile in existing Minuteman silos would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. Strategic Arms Limitation Treaties I and II both allow modernization of existing intercontinental ballistic missile launchers.

(U) The Peacekeeper missile deployed in existing Minuteman silos supports U.S. Strategic Arms Reduction Talks objectives. The system is verifiable by national technical means.

5.2.10.4 Missile Excursions (U)

a. Common Missile (U)

(U) Modifications made to Minuteman launch facilities for Common Missile installation will be similar to those in Peacekeeper. The smaller diameter canisterized Common Missile will allow slightly more rattlespace and maintenance access. The shock isolation system will be similar to Peacekeeper. Missile assembly will be performed on site and will require smaller transportation and handling equipment than for Peacekeeper. Electrical support systems and physical security will be identical. The Common Missile hardness is constrained by the existing Minuteman system facilities. The schedule is paced by Common Missile development and the estimated IOC of 1990 forecloses fielding the system in the 1980s.

b. Improved Minuteman III (U)

(U) Discussed in Section 5.2.11.

c. Small Missile (U)

(U) Not considered since a deployment of 1000 small missiles in existing Minuteman silos would require dismantling the entire Minuteman force and result in a decreased number of warheads on alert from today's alert force.

5.2.10.5 Summary (U)

(U) The primary value of this option would be to substantially increase the United States missile military capability. This increased capability might be a factor in the Strategic Arms Reduction Talks discussions.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

- **(U) Missile Excursion:** Marginal. The slightly (by a factor of 1.7) increased number of silos does increase Soviet attack price or U.S. survivability, but fewer hard targets can be put at risk.

ATTACK PRICE (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ATTACK DURATION (10% SURVIVORS) (U)

SECRET

[redacted]

SECRET

MILITARY CAPABILITY: (S) [redacted]

- (S) [redacted]

SURVIVABILITY: (S) [redacted]

- (U) **Missile Excursion:** Poor. Although additional silos are deployed, survivability remains poor.

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

[redacted]

ENDURANCE: (S) [redacted]

- (U) **Missile Excursion:** Poor. Same as Peacekeeper baseline.

RESILIENCY: (U) Poor. The system is vulnerable to the current threat. The only readily available growth option is ballistic missile defense.

- (U) **Missile Excursion:** Poor. Same as Peacekeeper baseline.

DEFENDABILITY: (S) [redacted]

- **(U) Missile Excursion:** Fair. Same as Peacekeeper baseline however additional interceptors would be required.

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

	Peacekeeper	Common
R&D	5.7	5.7
Production	10.3	10.4
Military Construction	0.6	0.7
Total Acquisition	16.6	16.8
10 Year O&S ($0.009/year added to current Minuteman cost)	0.09	0.1
Total Life Cycle	16.69	16.9

SCHEDULE: (U)

	Peacekeeper	Common
Rating	Outstanding	Poor
IOC	1986	1990
FOC	1989	1993

IOC Schedule Constraints: (U)

(U) Peacekeeper

- Congressional restriction on design is tied to Congressional review of the basing recommendation and completion of the environmental impact analysis process.

- Environmental impact analysis process completion is scheduled for January 1984.

(U) Common Missile

- Missile development

TECHNICAL RISK: (U) Outstanding. This is a low risk option with no pacing technology issues.

- **(U) Missile Excursion:**
  - Common Missile - Fair. The risk is associated with meeting the Air Force hardness requirements, both in-place and in-flight, without compromising Navy requirements for submarine use.

OPERABILITY/SUPPORTABILITY: (U) Good. Uses existing Minuteman sites with modified support equipment. Logistics and maintenance practices are well established, however, on-site missile assembly will slightly increase maintenance, vehicle, and personnel requirements.

- **(U) Missile Excursion:**
  - Common Missile - Fair. Increased manpower would be required to support the additional missiles deployed.

SITING: (U) Outstanding. This system uses existing Minuteman sites. Much of the siting and engineering work has already been completed. F. E. Warren is the proposed site based on Minuteman silo configuration and local geology.

- **(U) Missile Excursion:**
  - Common Missile - Outstanding. Similar to the Peacekeeper baseline, however additional silos would be required.

ENVIRONMENT: (U) Outstanding. Low overall environmental impacts are projected due to low, long term population in-migration. Construction is limited to minor silo and site work and some on-base support facilities. No new land is required.

- **(U) Missile Excursion:**
  - Common Missile - Outstanding. Same as baseline.

PUBLIC INTERFACE: (U) Good. There is no public exposure to the mated weapon system. However, there is some infrequent exposure to the unmated reentry vehicle during occasional transport between the silos and support base for periodic maintenance.

- **(U) Missile Excursion:**
  - Common Missile - Good. Essentially the same as Peacekeeper.

POLICY (U)

ARMS CONTROL: (U) Outstanding. This option is compatible with SALT I and/or SALT II if either were in effect at the time of deployment, and is verifiable. It also supports strategic force reductions and provides negotiating leverage.

- **(U) Missile Excursion:**
  - Common Missile - Good. The later IOC (1990) reduces leverage for current negotiations.

FOREIGN POLICY: (U) Outstanding. This alternative reflects U.S. resolve to modernize and adds to the perception that the U.S. is redressing the strategic imbalance. Deployment of Peacekeeper in Minuteman silos, by demonstrating U.S. political will to strengthen the land-based leg of the Triad, will help sustain and strengthen key allied government support of NATO nuclear force modernization.

- **Missile Excursion:**
  - Common Missile - Good. The later IOC could cause this alternative to have a reduced effect on sustaining and strengthening allied support for NATO nuclear force modernization.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- Prompt strike capability against hard targets
- Near term availability (IOC 1986)
- Low environmental impact
- Deployed at existing MM support base and uses existing MM sites
- Throw weight flexibility for penaids and/or large yield RVs

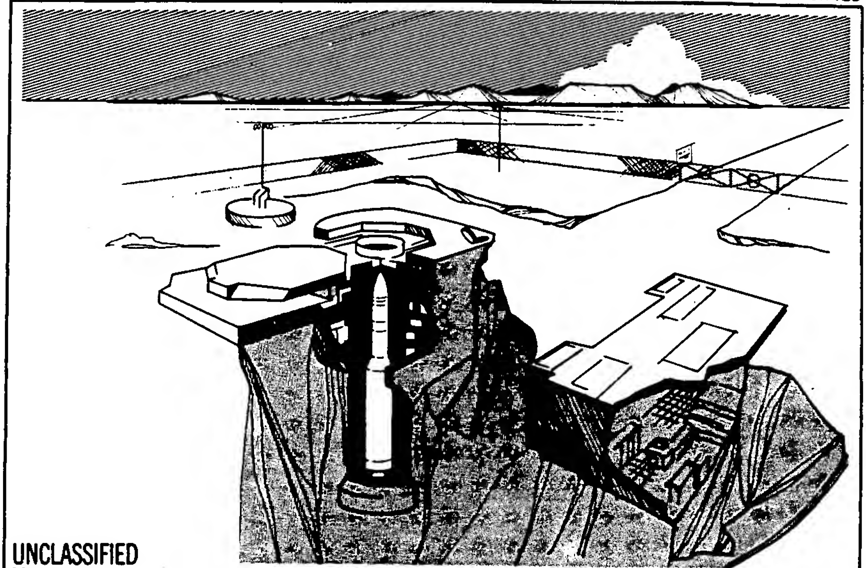
NEGATIVE FEATURES: (U)

- Current Soviet threat negates system quickly at very low price
- Limited growth opportunity

5.2.11 Improved Minuteman in Minuteman Silos

5.2.11 IMPROVED MINUTEMAN IN MINUTEMAN SILOS (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 350 enhanced Minuteman missiles
- 350 existing Minuteman launchers
- Improved guidance (Advanced Iner tial Reference Sphere)
- Minuteman extended survival power
- Mark 12A with path length fuze
- Status uplink and retargeting

5.2.11.1 Concept (U)

(U) Under this concept, improved military capability would be provided by upgrading the accuracy of the Minuteman system, improving the capability of the reentry system, and increasing operational flexibility with airborne launch control center status monitoring and retargeting. Other basing modifications may be required to provide a 10 year life.

5.2.11.2 Description (U)

(U) Minuteman III missiles would be enhanced as described in Section 4.1.3. The Minuteman extended survival power system would be incorporated into the system along with a new ultra-high frequency transmitter to provide status to the airborne launch control center.

(U) The Minuteman system uses site security comprised of multiple sensors. All violations are reported to the launch control centers and result in a response by the security police. When a site is open, it is under the direct surveillance of security personnel.

(U) Positive control of the system is provided by several manned launch control centers, including the existing Minuteman launch control centers and an airborne launch control system. Voice and data communications within the system are provided by hardened intersite cable and very high frequency radio systems. Connectivity to higher authority is also maintained by the primary alert system and Strategic Air Command digital information network. Target constant calculation capability will be added to the airborne launch control center which, along with the status uplink, provides a rapid target change capability to each missile.

(U) Logistics and support will require some modifications of depot capabilities to service the guidance system and the reentry vehicles.

5.2.11.3 Technical Assessment (U)

a. Survivability (U)

(U) This alternative does not provide any improvement in survivability to the existing Minuteman system.

(U) The current Minuteman force attains its current survivability through the moderate hardening previously accomplished of its protective silos. The Minuteman silo was designed to be survivable against relatively inaccurate weapons. Without sufficient accuracy even high yield weapons would be rather ineffective. However, for over a decade the Soviets have concentrated on placing United States intercontinental ballistic missiles at risk by significantly improving the accuracy of their intercontinental ballistic

missiles. The ability to further harden Minuteman silos is limited by the geology in which many of our current force is deployed. To maximize survivability of an improved Minuteman force, those missiles would be deployed in existing silos in the most suitable geology.

b. Attack Scenarios (U)

(S) [redacted]

(U) If the attack is timed for the simultaneous launch of Soviet intercontinental ballistic missiles and submarine-launched ballistic missiles the first nuclear detonation on U.S. soil would be a Soviet submarine-launched ballistic missile weapon. If U.S. forces were fully generated, this positive evidence of attack would increase the likelihood of timely retaliatory launch of U.S. intercontinental ballistic missiles. In this case virtually all U.S. intercontinental ballistic missiles could be launched prior to Soviet intercontinental ballistic missile detonations on U.S. intercontinental ballistic missile silos.

c. Resiliency to Threat Growth (U)

(U) The primary response to current and future threats could be the addition of ballistic missile defense.

d. Siting/Environment/Public Interests (U)

(U) The primary siting consideration was the use of existing Minuteman III sites. The sites more adaptable to improved Minuteman are located at Wing III, Minot Air Force Base, North Dakota (150 sites), and Wing V, F. E. Warren Air Force Base, Wyoming (200 sites). Other Minuteman III wings and squadrons may be considered as possible deployment sites. These wings are Wing VI at Grand Forks Air Force Base, North Dakota, and Wing I at Malmstrom Air Force Base, Montana. Wings I, II, and IV are excluded since they are Minuteman II wings.

(U) No silo construction is anticipated, and there are no geotechnical constraints.

(U) Deployment requires no new or disturbed land. System operations and maintenance does not require any additional people. Peak year employment during missile changeout may reach 200 people per wing.

e. Technical Issues (U)

(U) The technical issues apply only to the missile modifications and are discussed in Section 4.1.3.

f. Arms Control (U)

(U) Improvement of the existing Minuteman system could be completed fully within SALT I and/or SALT II constraints if either were in effect at the time of deployment, since the treaties would allow modernization of existing fixed launchers and missiles. Minuteman improvement would provide limited negotiating leverage since it would not represent as significant an addition to military capability as with other alternatives. It also would not represent a demonstrable U.S. modernization program in the same sense as the other alternatives. Increased force effectiveness would support strategic force reductions. The system poses no verification problems.

5.2.11.4 Missile Excursions (U)

None

5.2.11.5 Summary (U)

(U) A deployment of 350 improved Minuteman missiles in existing Minuteman silos provides the United States with an improved hard target kill capability against Soviet hardened targets. The system has little environmental impact, as it would be deployed at existing Minuteman sites and uses existing support facilities. However, while this alternative may have a low initial acquisition cost, it would require prolonging the life of our aging Minuteman force. This may lead to frequent subsystem refurbishment requirements and subsequently higher costs.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO: (S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (S) [redacted]

ATTACK PRICE (10% SURVIVORS) (ASSUMES FULL U.S. RIDEOUT) (U)

SECRET

[redacted]

SECRET

ATTACK DURATION (10% SURVIVORS) (U)

SECRET

[redacted]

SECRET

MILITARY CAPABILITY: (S) [redacted]

SURVIVABILITY: (S) [redacted]

U.S. SURVIVORS
(UP TO 308 SS-18 EQUIVALENTS APPLIED)
(ASSUMES FULL U.S. RIDEOUT) (U)

ENDURANCE: (S) [redacted]

RESILIENCY: (U) Poor. The system is vulnerable to the current threat. The only readily available growth is ballistic missile defense.

DEFENDABILITY: [redacted]

SYSTEM FEASIBILITY (U)

COST: (U) FY 82 $ (Billions)

	Improved Minuteman III
R&D	2.1*
Production	7.1*
Military Construction	0.07
Total Acquisition	9.3
10 Year O&S (no change to existing Minuteman)**	
Total Life Cycle	9.3

*Advanced inertial reference sphere (AIRS) guidance

**If modification or redesign of current Minuteman support equipment is required to support the 10 year service life, a considerable cost and logistics support penalty would be incurred. Prolonging the life of the Minuteman force beyond 10 years may lead to frequent subsystem refurbishment requirements and subsequently add costs.

SCHEDULE: (U)

	Improved Minuteman III
Rating	Fair
IOC	1988
FOC	1990

IOC Schedule Constraints: (U)

(U) Missile development is the primary constraint.

TECHNICAL RISK: (U) Good. This option is low risk with no significant or pacing technology issues to accomplish the modifications.

OPERABILITY/SUPPORTABILITY: (U) Outstanding. Current Minuteman practices apply to this option. If long term service life requirements are to be met, a considerable modification and redesign of existing support systems would be necessary This would require new procedures, etc., thus eliminating the ability to rely on current practices.

SITING: (U) Outstanding. Four of the six Minuteman Wings were evaluated. No new construction will be required for this modification.

ENVIRONMENT: (U) Outstanding. This option requires missile system modifications only, with no new land or construction required. Project impacts are negligible.

PUBLIC INTERFACE: (U) Good. Current Minuteman practices apply to this option. No public exposure to the mated weapon system. There is infrequent exposure to the unmated weapon system components during occasional transport between the support base and silos for periodic maintenance.

POLICY (U)

ARMS CONTROL: (U) Fair. This alternative would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. It provides only limited negotiating leverage since it does not entail an active production line nor as significant an addition to U.S. forces as other alternatives. Increased force effectiveness supports the U.S. START objective of significant reductions.

FOREIGN POLICY: (U) Fair. This alternative reflects national resolve to modernize our intercontinental ballistic missile force, and provides additional military capability. However, there is a possibility that this system would not be perceived as a serious attempt to redress the strategic imbalance.

SYSTEM SUMMARY (U)

POSITIVE FEATURES: (U)

- Prompt strike capability against hard targets
- Low environmental impact
- Deployed at existing Minuteman support bases and uses existing Minuteman sites

NEGATIVE FEATURES: (U)

- Current Soviet threat negates system quickly at very low price
- Lack of growth options
- Not a firm demonstration of resolve to modernize ICBM forces
- Limited throw weight flexibility
- No net increase in weapons deployed
- Aging support systems

5.3 Ballistic Missile Defense

5.3 BALLISTIC MISSILE DEFENSE (U)

5.3.1 Overview and History of Defense (U)

(U) Since the early 1950s, ballistic missile defense has been considered an option to reduce the vulnerability of high-value targets, particularly intercontinental ballistic missiles. In support of this option the United States Army has been developing the technology, system concepts, and related hardware required for such deployments. The Safeguard ballistic missile defense system was fully operational in October 1975 to protect United States intercontinental ballistic missiles at the Grand Forks missile complex, but was terminated by direction of Congress in February 1976. Subsequent ballistic missile defense efforts have concentrated on advanced technology development and system concepts to support future ballistic missile defense deployment options.

(U) The contribution of ballistic missile defense is highly correlated to the deployment mode and mission of the intercontinental ballistic missile to be defended. Traditionally, the role of ballistic missile defense is to enhance the survivability of an intercontinental ballistic missile system. A measure of effectiveness of ballistic missile defense is the increased inventory of attacker weapons required to achieve a given level of damage. Depending upon the basing mode, ballistic missile defense may also enhance the operational flexibility of an intercontinental ballistic missile system. For example, ballistic missile defense may be able to provide missile fly-out windows during pindown or direct attack on closely spaced basing. As a minimum, ballistic missile defense increases the uncertainty of the outcome of the attack, and increases the attack price (or reduces the damage level) and increases the duration of an attack necessary to achieve a given level of damage.

5.3.2 Ballistic Missile Defense Concepts (U)

(U) Ballistic missile defense interceptors are designed to take advantage of the environment in which they operate – either in the endoatmosphere or the exoatmosphere.

(SRD) [redacted]

[redacted]

(S-RD) [redacted]

(U) Ballistic missile defense systems consisting of components that operate both endo and exoatmospherically comprise a layered defense. This concept consists of two tiers of defense, operated independently, to minimize the number of reentry vehicles penetrating the defense area. The first tier, known as the overlay, would intercept at long-range, exoatmospherically. The second tier, or underlay, would be a terminal defense system, operating endoatmospherically. The underlay would engage only those reentry vehicles surviving the overlay portion of the system, so that the number of underlay radars and missiles required would be significantly reduced compared with those of a "stand-alone" endoatmospheric system. The interaction between the defense tiers reduces the overall reentry vehicle "leakage" compared to a "stand-alone" system.

5.3.3 Current Technology/Hardware Status (U)

5.3.3.1 Ballistic Missile Defense Components (U)

(S) [redacted]

(C) [redacted]

5.3.3.2 Nonnuclear Kill Options (U)

(U) Research and development on nonnuclear kill of reentry vehicles has been conducted by the United States Army for about 15 years. The interest in such systems is obvious: nuclear release authority would not be required, possibly reducing system reaction time; transportation and security requirements would be greatly simplified; and critical production of significant numbers of additional nuclear warheads would not be required.

(C) [redacted]

[redacted]

5.3.3.3 Simple, Novel Systems (U)

(C) [redacted]

5.3.4 Ballistic Missile Defense Utility (U)

(S) [redacted]

(U) The potential ballistic missile defense contribution to each of the basing approaches discussed in Section 5.2 is addressed briefly below.

5.3.4.1 Closely Spaced Basing (U)

(U) An Anti-Ballistic Missile Treaty constrained ballistic missile defense could be effective in defending closely spaced basing. With the intercontinental ballistic missile deployment in a north to south oriented column, the defense interceptors could be deployed so that all interceptors can defend all silos, allowing preferential defense strategies to be easily employed. Moreover, the stylized attacks forced by closely spaced basing enhance ballistic missile defense effectiveness.

(U) Ballistic missile defense of closely spaced basing could achieve a number of important goals. It would increase the number of weapons required for a given level of damage and compound the attacker's uncertainty. A ballistic missile defense system could also be used to provide a flyout window for the intercontinental ballistic missiles

constrained by either endoatmospheric or exoatmospheric pindown tactics. The system would conform to Anti-Ballistic Missile Treaty quantity limits and provide a basis for growth against responsive threats.

(U) A highly resilient layered defense system using existing Spartan interceptors, a long-range phased array radar, and the airborne optical adjunct sensors for the exo-defense; and a terminal interceptor, associated radar, and the airborne optical adjunct sensors for the endo-defense, could be deployed (Figure 5.3-1).

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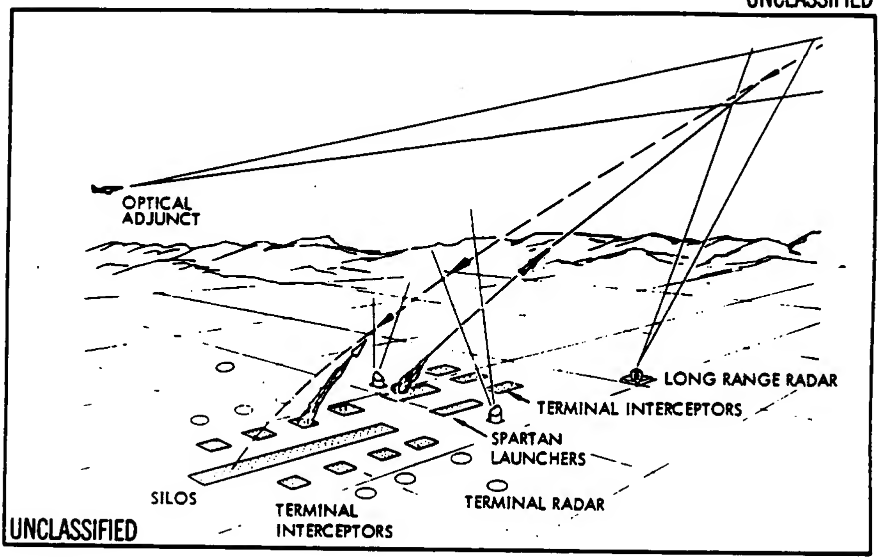

Figure 5.3-1. (U) Closely Spaced Basing Defense System

(S) [redacted]

(S) [redacted]

(S) [redacted]

5.3.4.2 Closely Spaced Basing With Concealment (U)

(U) A ballistic missile defense system deployed with this basing mode would support the intercontinental ballistic missile mission in essentially the same way as the baseline (100/100) closely spaced basing configuration. The defense also could be based with concealment and could maintain a significant level of effectiveness without the Spartan overlay.

5.3.4.3 Widely Spaced Basing in Superhardened Silos (U)

(S) [redacted]

[redacted]

(S) [redacted]

(S) [redacted]

5.3.4.4 South Side and Deep Underground Basing (U)

(U) These concepts and their potential threats are not sufficiently developed to permit a meaningful evaluation for defense needs. Defense of south side basing may be constrained by the effect of adverse terrain on siting and system performance. Defense of deep underground-based missiles does not appear necessary, however, pre-dug launch tunnels could be defended in the same manner as silos to enhance egress survivability.

5.3.4.5 Multiple Protective Shelters (U)

(S) [redacted]

[redacted]

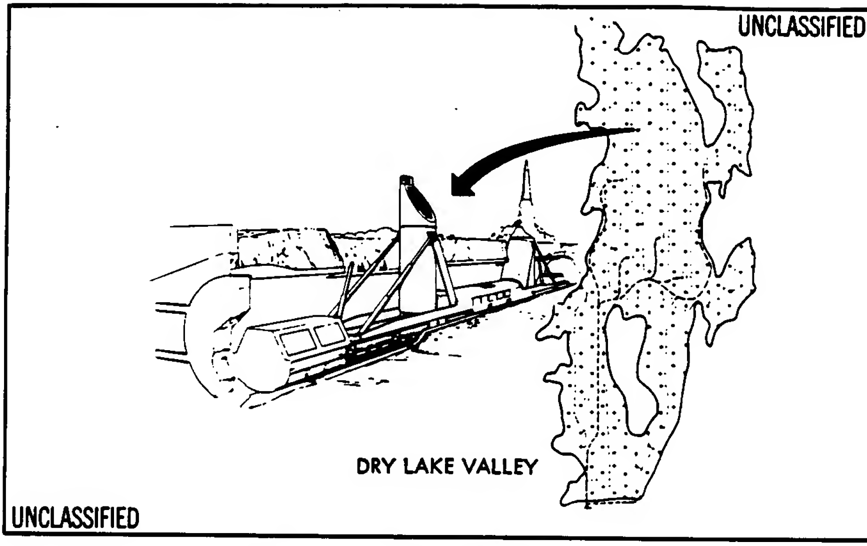

Figure 5.3-2. (U) Defense System for Multiple Protective Shelters

(C) [redacted]

(S) [redacted]

5.3.4.6 Road Mobile (U)

(U) The dash-on-warning, hard road mobile alternative relies on early detection of an attack to create a large area of location uncertainty. An endo-defense could aid in negating the submarine-launched ballistic missile threat and allow the mobile missiles to escape into larger dispersal areas. This defense could also allow more of the mobile missiles to remain garrisoned which would reduce the roaming area required or increase the Soviet attack price.

(U) The continuous road mobile alternative (on public highways) relies on concealment for survivability and is not particularly suited to defense enhancement.

5.3.4.7 Existing Minuteman Silos (U)

(C) [redacted]

5.3.5 Defense Performance (U)

5.3.5.1 Methodology (U)

(U) The defense effectiveness of the intercontinental ballistic missile basing modes is measured as the price in Soviet equivalent SS-18 boosters required to kill 90% or 50% of the intercontinental ballistic missile force. One of the benefits ballistic missile defense provides the intercontinental ballistic missile force is to extract a higher attack price from the Soviets to achieve the same levels of kill as in the undefended case.

(U) The presence of ballistic missile defense for the intercontinental ballistic missile presents two attack options for the Soviets; a direct intercontinental ballistic missile attack or a suppression attack on the defense followed/coupled with a direct intercontinental ballistic missile attack. The ballistic missile defense systems analyzed consider all defense suppression attacks and direct intercontinental ballistic missile attack effectiveness. The most stressing attack on the U.S. intercontinental ballistic missile and defense systems is used for all effectiveness analysis.

(U) Ballistic missile defense effectiveness results are based on optimized defense tactics and attack tactics for an attack which strives to negate the United States intercontinental ballistic missile force (90% kill). Defense tactics employ the best expected leverage considering the postulated threat (as described in Sections 2 and 5.2) and the ballistic missile defense configuration for each intercontinental ballistic missile basing mode. The defense option is analyzed as an addition to the existing intercontinental ballistic missile basing mode and does not include an optimized (cost effective and most resilient) defended intercontinental ballistic missile option which in several cases would result in modifications to both the ballistic missile defense and the intercontinental ballistic missile basing configuration.

(U) All intercontinental ballistic missile basing modes analyzed are defendable with an endoatmospheric terminal defense system only. However, the closely spaced basing options are uniquely suited for ballistic missile defense layered systems in that defense could break up structured spike and pindown attacks. For this reason, the Soviet prices charged by the defended closely spaced basing options are compared for both the layered and the terminal only defense.

(U) The presence of an exoatmospheric capability to the defense adds the flexibility to break up stylized spike attacks. Because Spartan could break up an intercontinental ballistic missile pin attack, allowing some flyout capability, the attacker must pin at a higher rate in the exoatmosphere to prevent flyout. The price for such an attack is large and is reflected in the data for closely spaced basing when the Spartan is incorporated in the defense option. Only the closely spaced basing modes allow for an effective ballistic missile defense within the Anti-Ballistic Missile Treaty constraints.

5.3.5.2 Effectiveness (U)

Defended Closely Spaced Basing - 100/100 (U)

(S) [redacted]

[redacted]

(S) [redacted]

(S) [redacted]s.

(S) [redacted]

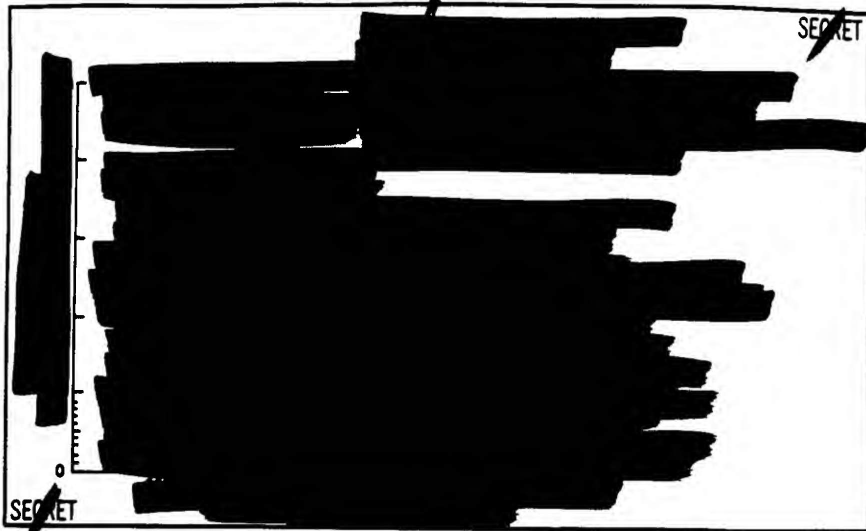

Figure 5.3-3. (U) Defended Closely Spaced Basing - 100/100

Defended Closely Spaced Basing With Concealment - 100/300 (U)

(S) [redacted]

[redacted]

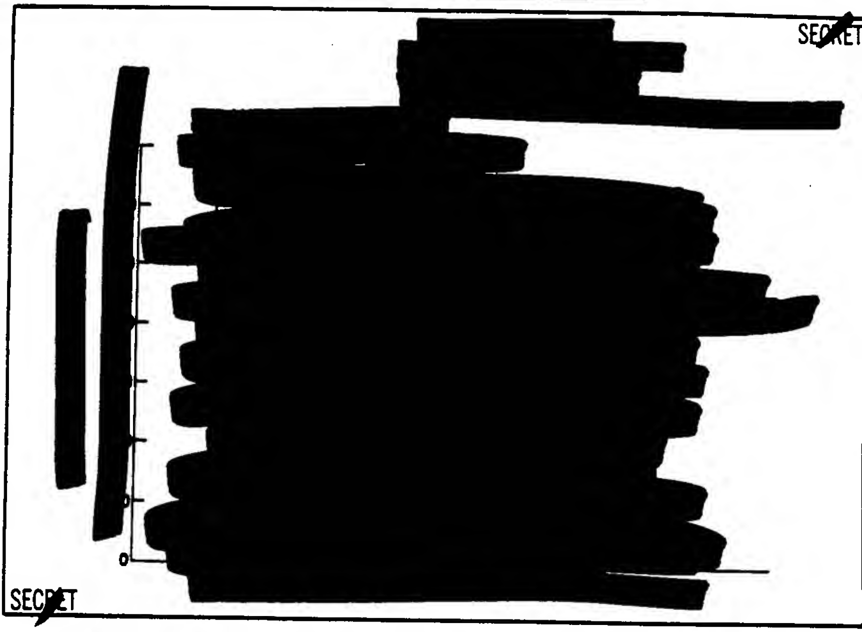

Figure 5.3-4. (U) Defended Closely Spaced Basing With Concealment - 100/300

Defended Road Mobile (U)

(U) Defense of this alternative system could allow significant reductions in required area as shown in Figure 5.3-5. For example, operating area requirements for a 50% kill might be reduced from 25,000 square miles to 12,500 square miles. Defense might allow a garrison mode of operation for the hard mobile system.

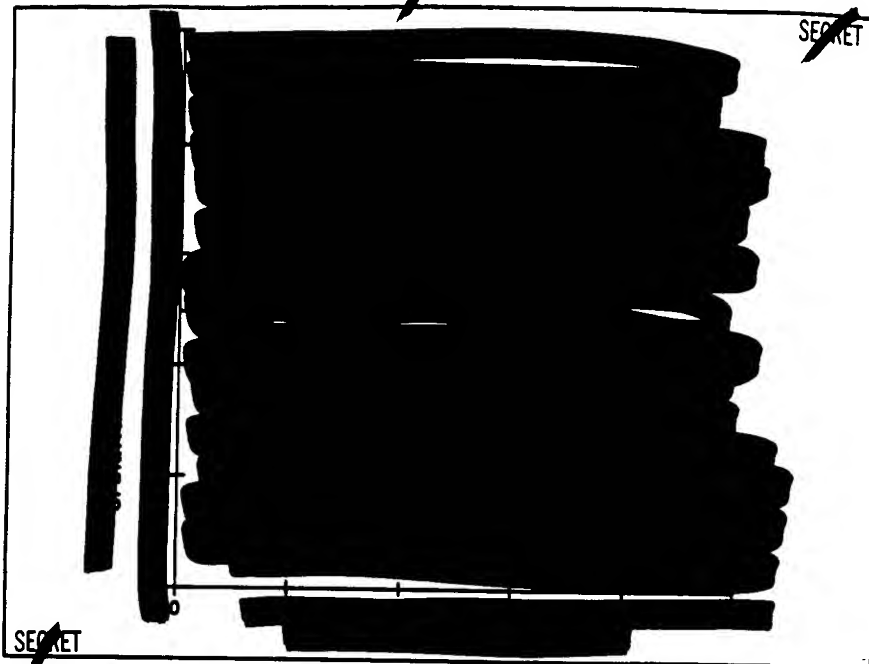

Figure 5.3-5. (U) Defended Road Mobile Operating Area Requirements

Defended Multiple Protective Shelter - 200/4600 (U)

(S) [redacted]

[redacted]

(S) [redacted]

Defended Silo Basing Alternatives (U)

(S) [redacted]

(U) The attack prices shown in Figure 5.3-8 reflect the high tapered preferential defense leverage. These results incorporate the defense of some Minuteman IIIs in addition to Peacekeeper or improved Minuteman III. The survival levels shown are for Peacekeeper or improved Minuteman III only, and can be compared directly with the undefended results in Section 5.2 (percent survivors).

Figure 5.3-6. (U) Defended MPS 200/4600

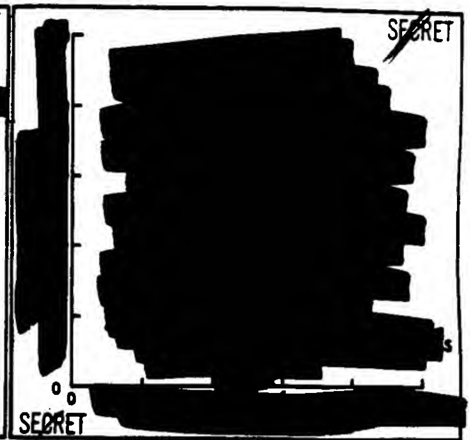

Figure 5.3-7. (U) MPS Shelters Required

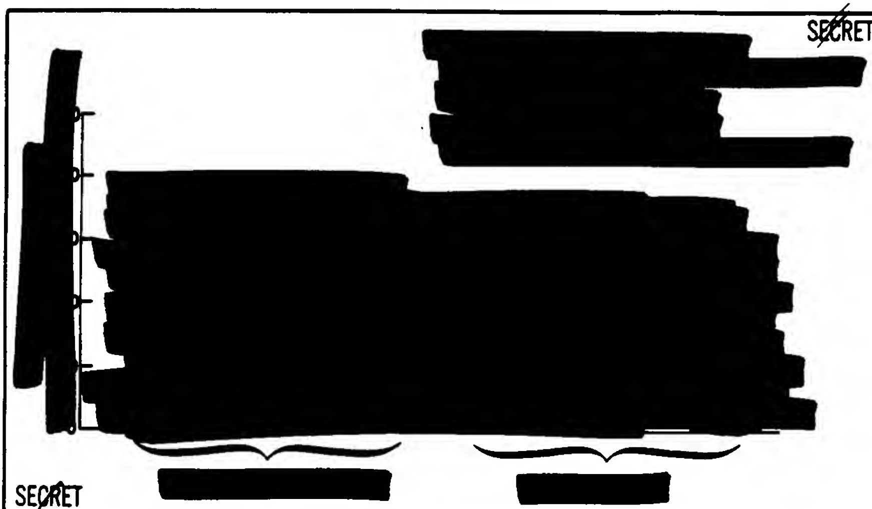

Figure 5.3-8. (U) Defense of Widely Spaced Basing and Minuteman Silo Modes

5.3.6 Cost (U)

(U) Cost data for ballistic missile defense is given in Table 5.3-1. Some of the defense options addressed in this report have not been costed for the performance levels and quantities addressed herein. In some cases, there is more than one ballistic missile defense concept applicable to an intercontinental ballistic missile basing option. The costs are in FY 82 dollars. A range is shown for the sum of RDT&E and acquisition costs to account for current uncertainties such as design definition and deployment quantities. An additional range is shown in the one year operations and support costs to allow for uncertainties in operational manning and the potential of sharing equipment, facilities and manpower with the intercontinental ballistic missile forces.

Table 5.3-1. Ballistic Missile Defense Cost/Comparison Schedule (Cost in Billions of FT 82 dollars) (U)

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BASING OPTION	RDT&E COST	INVESTMENT COST	O&S COST (1 YEAR)	TOTAL ACQUISITION COST	VARIANCE ACQUISITION COST	TOTAL LIFE CYCLE COST*
CSB	6.1	5.4	0.256	11.5	10.4-14.0	14.3
CSB WITH CONCEALMENT	6.9	8.1	0.334	15.0	13.5-18.0	18.7
IMPROVED MINUTEMAN / WIDELY SPACED BASING	4.0	13.4	0.777	17.4	15.7-20.9	25.9
MULTIPLE PROTECTIVE SHELTERS (200/4600)	3.1	9.8	0.211	12.9	11.7-15.6	15.2
MOBILE / SOUTH-SIDE / DEEP UNDERGROUND	NOT COSTED					

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*Includes total acquisition cost 10 year O&S.

5.3.7 Conclusion (U)

(U) The results above show that ballistic missile defense can provide substantial benefits for the U.S. strategic force through increased survivability, or charging a much higher Soviet attack price for a given level of survivability, and greatly decreasing any confidence a Soviet commander could have in being able to effectively plan and carry out such an attack. The Air Force basing alternatives by themselves, through the use of extreme hardness, deceptive basing, and geographic location, present formidable targets

against potential Soviet attack. These attributes provide substantial leverage and effectiveness to the defense systems. An effective missile defense can only be provided for the closely spaced basing alternative within the constraints of the Anti-Ballistic Missile Treaty. The utility of ballistic missile defense of the other basing alternatives considered would be greatly reduced by deployments that are consistent with the Anti-Ballistic Missile Treaty..

6.0 TRIDENT II (D-5) SLBM

6.0 TRIDENT II (D-5) SUBMARINE LAUNCHED BALLISTIC MISSILE (U)

PROGRAM HIGHLIGHTS (U)

(U)
- Prompt* hard target kill capability
- Survivable sea-based deterrent for the future
- Designed for existing Trident submarine launch tubes
- Two Trident submarine support bases - Kings Bay, Georgia/Bangor, Washington
- Acceleration of 1989 initial operational capability for D-5 no longer feasible

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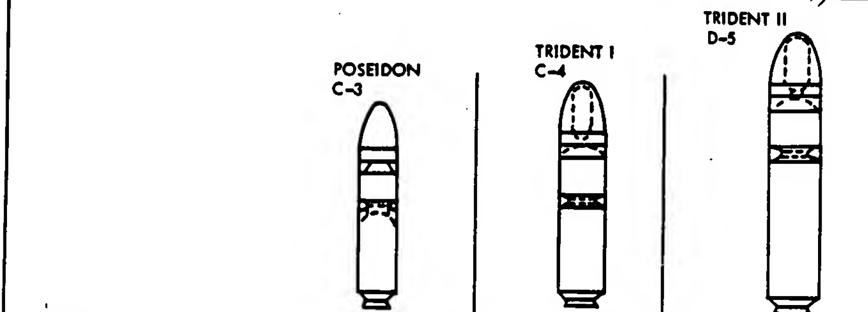

CEP (FT) AT MAX PAYLOAD RANGE ([redacted] NAUTICAL MILES)	GOAL ACHIEVED RANGE (NM) [redacted]	GOAL ACHIEVED RANGE (NM) [redacted]	GOAL [redacted] RANGE (NM) [redacted]

[redacted]

SECRET

Figure 6-1. (U) Submarine Launched Ballistic Missiles

6.1 CONCEPT (U)

(U) Trident II (D-5) is the submarine launched ballistic missile being developed by Navy as a follow-on to the Polaris/Poseidon/Trident I family of missiles. The missile will be effective against the full spectrum of Soviet assets and will continue to provide a high confidence survivable sea-based deterrent well into the next century.

(S) [redacted]

(U) Specific objectives of the Trident II weapon system are to:

- Maintain the survivability of the SLBM launch platform
- Minimize total weapon system costs by increasing SLBM payloads to that permitted by the size of the Trident submarine launch tube, thereby allowing for mission capability to be achieved with fewer submarines.
- Enhance U.S. strategic posture by adding prompt hard target kill capability to the SLBM arsenal, and improve our nuclear deterrent in the presence of increasing Soviet capabilities and force levels.
- Provide for a strong position in strategic arms negotiations by developing a weapon system with performance and payload flexibility to accommodate various treaty initiatives.

6.2 DESCRIPTION (U)

(~~S~~RD) [redacted]

DESIGN CHARACTERISTICS (U)

(U) **Technical**

Weight	130,000 lbs (maximum)
Length	44 feet
Diameter	83 inches

(~~S~~RD) **Operational***

Maximum payload range	[redacted] nautical miles
System circular error probable	[redacted]
System reliability	[redacted]
Maximum payload/yield	[redacted] nautical miles
Initial operational capability	[redacted]

* [redacted]

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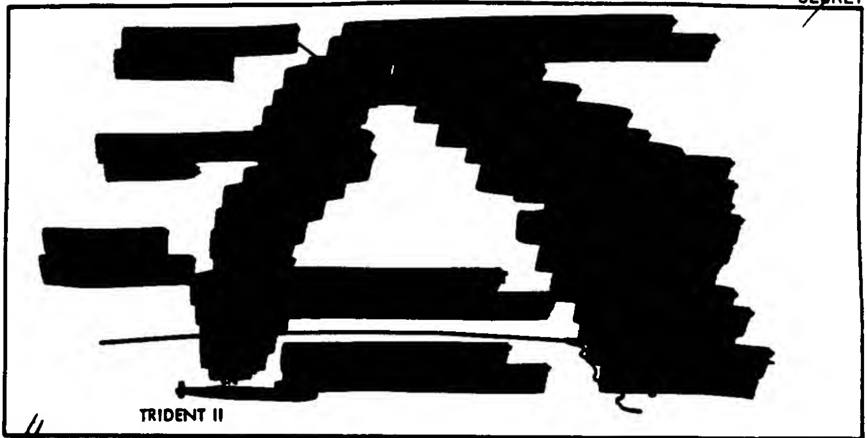

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Figure 6-2. (U) Trident II/D-5 Weapon System Sequence of Events

(SRD) Other Operational Characteristics

Footprint - [redacted]

Endurance - [redacted]

Retargeting - [redacted]

At sea rate - [redacted]

6.3 TECHNICAL ASSESSMENT (U)

a. Survivability (U)

(S) [redacted]

[redacted]

b. **Attack Scenario (U)**

(S) [redacted]

c. **Resiliency to Threat Enhancement (U)**

(S) [redacted]

d. **Siting (U)**

(U) The first 10 submarines to be configured for Trident II will be based at Kings Bay, Georgia. Supporting maintenance, strategic weapons and training facilities will be completed at Kings Bay in time to support the initial operational capability of the missile. In the mid-1990s, the Naval Submarine Base at Bangor, Washington will be reconfigured to support Trident II, and the second 10 submarines configured as D-5 will be based there. There will be no additional significant environmental concerns for this program. A third squadron of 10 submarines could be accommodated at Kings Bay with some additional construction of waterfront and support facilities. The total number of Trident submarines to be built has not yet been determined and is currently under study.

e. **Technical Issue/Risk (U)**

(C) [redacted]

CONFIDENTIAL

Initiated concept definition
Commenced advanced development phase
Commence full scale engineering development
First missile development flight test
First SSBN-launched performance evaluation missile flight test
Initial operational capability

[redacted]

CONFIDENTIAL

(S) [redacted]

(U) There are two other alternatives for program acceleration which are still achievable:

- (S) [redacted]
- (S) [redacted]

[redacted]

f. **Arms Control (U)**

(U) The Trident alternative would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. Its deployment would generally support U.S. START objectives. However, the Trident alternative would not provide the same force flexibility at reduced levels found with a modernized triad. In addition, because of the 1989 initial operational capability for the D-5 system and the lack of resolve to modernize the strategic triad that this alternative represents it would provide less U.S. START negotiating leverage than some other options. For these reasons, this alternative received a good rating.

PERFORMANCE EVALUATION (U)

ATTACK SCENARIO. (S) [redacted]

STRATEGIC CAPABILITY (U)

DETERRENCE: (U) Outstanding. Soviet current inability to threaten the system, coupled with the system's capability to strike the entire spectrum of Soviet assets would help to remove the preemptive strike incentive from the Soviet planner and provide a secure, effective retaliatory strike capability for the United States.

MILITARY CAPABILITY: (U) Outstanding. Each Trident submarine carries 192 hard-target-capable warheads. The system's response time will be a function of the operational patrol procedures directed by the CINC, and in any event, will be sufficiently prompt. A requirement for promptness can be driven by the nature of the damage requirements against the target base (i.e., destruction of missiles in their silos, mobile targets, and critical command and control installations). Other requirements for promptness are less stringent, and are achievable by the Trident II system. The system possesses an almost unlimited onboard retargeting capability.

SURVIVABILITY: (S) [redacted]

ENDURANCE: (S) [redacted]

[redacted]

RESILIENCY: (U) Outstanding. System is not threatened by current Soviet strategic systems and its capability is thereby independent of any change in size or quality of Soviet strategic forces. An intensive Soviet effort in ASW would be necessary to pose a threat to the at-sea SSBNs. No technological breakthrough is currently forecast that would render the Soviet problem less stressing upon soviet ASW resources. Theoretical threats can be countered by operational procedure changes. However, a U.S. move to a Dyad would allow the Soviets to direct additional resources to ASW. The building rate of Trident systems can be doubled if necessary in response to increased targeting requirements.

DEFENDABILITY: (U) Not applicable. SSBNs benefit from inherent defenses, both passive and active, against the ASW threat.

SYSTEM FEASIBILITY (U)

***COST:** (U) FY 82 $ (Billions)

R&D	2.6
Ship Construction	12.8
Weapon Procurement	5.5
Military Construction	1.2
Total Acquisition	22.1
10 Year O&MN	4.0
Total Life Cycle	26.1

*(S) [redacted]

SCHEDULE: (U)

Marginal
IOC - 1989
FOC - Not defined

IOC Schedule Constraints: (U) D-5 missile IOC cannot be accelerated if missile performance requirements are to be achieved. The building rate of SSBNs and missiles can be increased.

TECHNICAL RISK: (U) Good. Some new technology will be required, but the technological concepts to be used are proven.

OPERABILITY/SUPPORTABILITY: (U) Outstanding. The Navy has operated and supported SSBNs for over 20 years, and foresees no problems unique to the Trident system. Limited experience with the USS Ohio substantiates this projection.

SITING: (S) [redacted]

ENVIRONMENTAL: (U) Outstanding. Impact on environment while operational is negligible, and environmental impact of bases is no more severe than the impact of bases for any other Navy ships.

PUBLIC INTERFACE: (U) Outstanding. Public interface with the missile and/or warhead is practically nonexistent.

POLICY (U)

ARMS CONTROL: (U) Good. Deployment would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. The Trident deployment would support U.S. START objectives, but would provide less negotiating leverage than other alternatives.

FOREIGN POLICY: (U) Marginal. While this alternative would increase U.S. strategic capabilities, it could be construed as indicating an unwillingness to subject the United States homeland to the same basing risks we are asking the NATO nations to assume with Pershing II and GLCM, thereby weakening support in key NATO governments for NATO nuclear force modernization. It also could possibly be interpreted as an indication of a lack of resolve to modernize the Triad, and a drift towards a Dyad.

SYSTEM SUMMARY (U)

POSITIVE FEATURES (U)

- Very high survivability
- Low environmental impact
- No public exposure to weapons
- Secure reserve force
- Invulnerable to current threat

NEGATIVE FEATURES (U)

- Initial opeational capability cannot be accelerated
- Eliminates Triad synergism
- Mid-1990s before D-5 could assume intercontinental ballistic missile role

ASSESSMENT

7.0 COMPARATIVE ASSESSMENTS (U)

(U) In Section 5.2, a technical assessment and evaluation was performed for each of the basing alternatives. The technical assessments addressed how the systems derive survivability; likely Soviet approaches for attacking the system; siting, environment, and public interests; the ability of the system to respond to Soviet threat growth; technical issues and risks due to technology required by the alternative; and arms control and foreign policy issues.

(U) In this section, the basing alternatives are compared for each of the criteria used in the evaluation. Additionally, the Trident II is assessed as an alternative to intercontinental ballistic missile modernization.

7.1 STRATEGIC CAPABILITY (U)

(U) Strategic capability is a relative measure of the military value of a system. In this analysis, it has been assessed with respect to six criteria: deterrence, military capability, survivability, endurance, resiliency, and defendability. Comparisons for each of these criteria are given below.

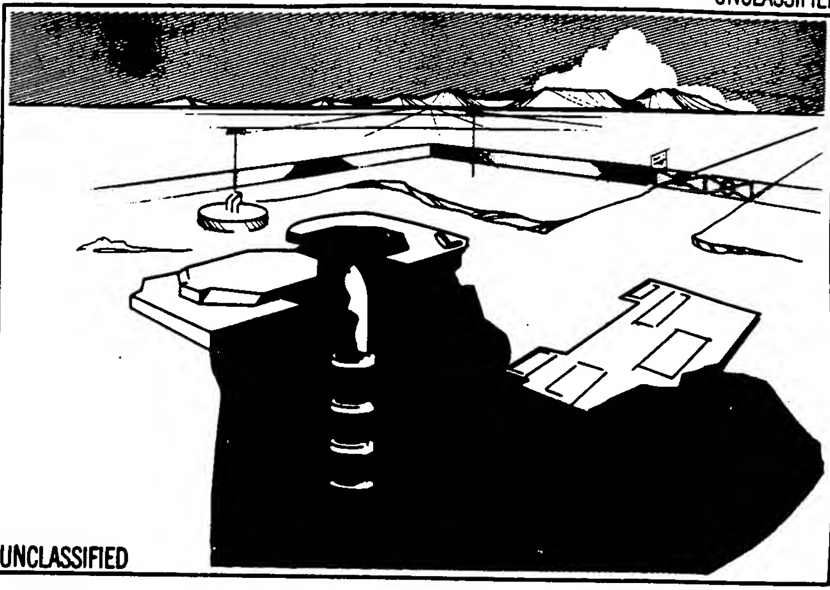
7.1.1 Deterrence (U)

(U) Deterrence is measured in terms of the Soviet view of the capability of the system and the consequences to them that might occur if they were to attack. Major considerations include assessments of the prompt retaliatory strike capability, Soviet attack requirements, Soviet confidence in such an attack, and the survivability of the system.

(U) All alternatives provide additional deterrent capability. Differences in deterrent value are largely due to variations in survivability, Soviet uncertainty in attack success, Soviet attack price, and Soviet perception of our capability. All three closely spaced basing alternatives provide outstanding deterrence because they have excellent firepower, prompt retaliatory capability, and the Soviets cannot mount a high confidence attack against these systems. Deep basing, although it has excellent survivability, does not have a prompt response capability and the road mobile alternatives do not have a prompt

5.2.10 MINUTEMAN SILOS - PEACEKEEPER (U)

UNCLASSIFIED



UNCLASSIFIED

(U) SIGNIFICANT FEATURES

- 100 Peacekeeper missiles
- 100 existing Minuteman launch facilities
- Spacing 3-5 miles
- Operational base - F. E. Warren Air Force Base
- Two squadrons
- On-site missile assembly
- Modified Minuteman equipment
- Existing launch control centers
- Extended survivable power

5.2.10.1 Concept (U)

(S) [redacted]

[redacted]

5.2.10.2 Description (U)

(U) The Minuteman launch facilities are vertical reinforced concrete structures that include the operational support equipment essential for launch. The missiles would be assembled on-site as they are installed into the silos. A new vertical and horizontal shock isolation system designed for compatibility with Peacekeeper would be required. Other modifications to the existing facilities would include provisions for extended survival power and additional electronics cooling capability. New transportation and handling equipment would be necessary because Peacekeeper is heavier and larger than Minuteman.

(U) The system would be supported from the present base at F. E. Warren Air Force Base with new facilities added to house the missile stages and supporting hardware. Co-use of available facilities would be planned for other support requirements.

(U) The physical security system required is the same as Minuteman. Multiple sensors detect intrusions at the unmanned sites, and trigger the dispatch of strike teams. When a site is open, it is under the direct surveillance of security personnel.

(U) System safety considerations will require a review of the safety zone around the Minuteman sites for compliance with Peacekeeper. Minuteman excludes inhabited buildings up to 1200 feet; the Peacekeeper requirement is 1750 feet due to the increased propellants creating a greater explosive equivalent.

(U) The number of missiles available for launch at any given time is estimated to be slightly less than that currently achieved with Minuteman due to the increased maintenance and start-up time for the Peacekeeper missile. The operation and launch of Peacekeeper will follow Minuteman procedures and timelines.

(U) Maintenance at the launch sites is more complex for Peacekeeper than for Minuteman because of total missile on-site assembly. Off-site assembly is feasible, but would require a major upgrade of the local road network to permit missile transport. Electronics maintenance is similar to that for Minuteman, except that guidance drawer replacement is easier for Peacekeeper.

5.2.10.3 Technical Assessment (U)

a. Survivability (U)

(S) [redacted]

b. Attack Scenarios (U)

(S) [redacted]

c. Resiliency to the Threat Enhancement (U)

(U) Improving the survivability of Peacekeeper in Minuteman silos could require the addition of ballistic missile defense.

response capability against hard targets. Multiple protective shelters provides outstanding military capability, but it has lower survivability than those that rated outstanding. These alternatives were rated good. The remaining systems provide fair deterrence. They retain desirable intercontinental ballistic missile characteristics, but with lower survivability than other alternatives. (Figure 7-1)

ATTACK PRICE (10% SURVIVORS)
PROJECTED THREAT EXCURSION (1989)
(ASSUMES FULL U.S. RIDEOUT) (U)

[redacted]

Figure 7-1. (U) Attack Price (10% Survivors) Projected Threat Excursion (1989) (Assumes Full U.S. Rideout)

7.1.2 Military Capability (U)

(U) Military capability is a measure of the degree to which the system retains desirable intercontinental ballistic missile characteristics and the ability to place Soviet

hardened targets at risk. Multiple protective shelter provides outstanding military capability because of the 200 missiles deployed. If normalized to approximately 1000 warheads, as the other alternatives were, multiple protective shelter military capability would be good. The closely spaced basing alternatives and all other Peacekeeper alternatives are also outstanding due to their ability to hold Soviet hard targets at risk.

(U) Deep basing, due to its lack of prompt retaliatory capability, was rated fair. Improved Minuteman III was also rated fair, since no net gain in weapons would be achieved even though an improvement in hard target kill capability would be achieved. Road mobile alternatives are rated fair because of the reduced accuracy of the delivered weapons and reduced promptness. Methods to improve accuracy may further reduce the promptness of these alternatives, resulting in the retention of the fair rating. The balance of the alternatives provide good military capability.

7.1.3 Survivability (U)

(U) Survivability is a measure of the ability of the system to survive a Soviet attack. For the purpose of comparative analysis, the systems were analyzed for the current Soviet threat capability and a projected threat excursion (1989).

(U) For the current threat capability, all systems, except the Minuteman silo alternatives, provide outstanding survivability. The Minuteman alternatives have vulnerabilities which have led to the search for a new survivable intercontinental ballistic missile basing mode; they can be negated in a relatively low price, short duration, Soviet attack. As a result, the two Minuteman silo alternatives rate poor for the threats analyzed. However, the Soviets would probably use submarine-launched ballistic missiles against other strategic targets at the same time they attacked the Minuteman silos; and in this case, nuclear detonations on U.S. soil of Soviet submarine-launched ballistic missile weapons would provide positive evidence of attack. Therefore, the likelihood of a timely retaliatory launch of U.S. intercontinental ballistic missiles before the arrival of the Soviet intercontinental ballistic missiles would be increased.

(S) [redacted]

[redacted]

FIRST WAVE SURVIVORS PROJECTED THREAT EXCURSION (1989) (U)

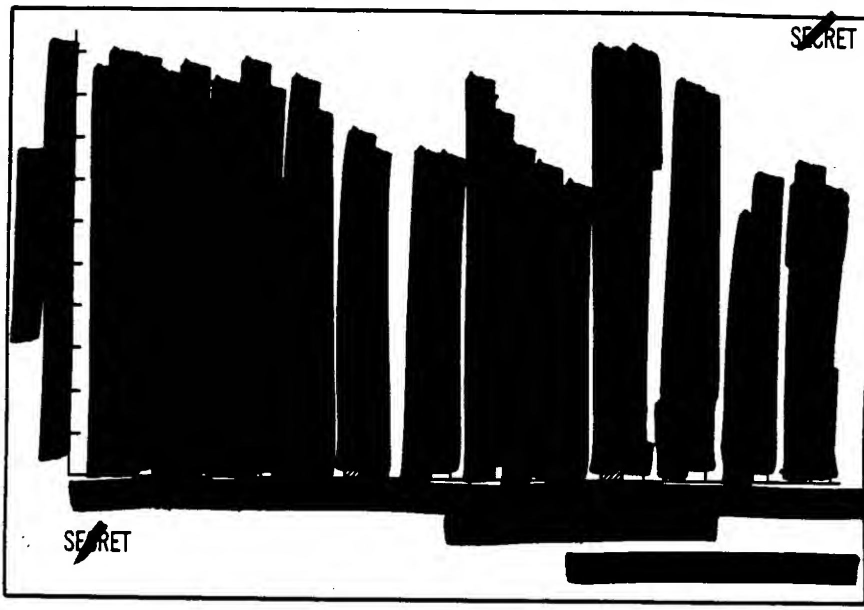


Figure 7-2. (U) First Wave Survivors Projected Threat Excursion (1989)

(U) Closely spaced basing introduces an additional attack consideration called "pin-down." Pindown could be perceived by the Soviets as a need to use weapons to attempt to deny United States missile launch capability prior to arrival of direct attack weapons and between attack waves. This would substantially increase their price to attack these alternatives. Pindown does not appear to be a credible strategy for the Soviets to employ,

due to the timing and resources required, and the uncertainty, in their view, of the ability to prevent the U.S. from flying out its intercontinental ballistic missiles.

(U) Hard road mobile has good survivability, if sufficient warning exists to allow a 15 mile dash. Without the ability to expand the target area through the dash, the survivability would diminish.

(S) [redacted]

7.1.4 Endurance (U)

(S) [redacted]

7.1.5 Resiliency (U)

(U) To respond to a particular basing alternative, the Soviets may develop reactive threats to attack the system. Resiliency refers to the ability of the system to counter the reactive threats and preserve system effectiveness.

(U) Minuteman silo alternatives are rated poor, since these can be defeated by the current Soviet threat, so there is no need for the Soviets to develop reactive threats. The only available growth option is ballistic missile defense. South side is also rated poor since the limited sites available allow no room for system expansion. The multiple protective shelters concept does not require the development of reactive threats by the Soviets. Since multiple protective shelters provides the possibility for increasing the number of shelters and/or adding defense, it is rated marginal. Widely spaced basing also provides marginal resiliency. Expansion or defense would be difficult.

(U) Road mobile resilience is very good to outstanding depending on the configuration. The two mobile alternatives have good survivability and could respond to Soviet threat growth through expanding the patrol areas; increasing system size. The hard road mobile, could add area defense and is considered to have outstanding resilience. Deep basing resilience is also outstanding. Deeper vaults, countermeasures, or system expansion could be used to neutralize reactive threats.

(U) The closely spaced basing alternatives rate outstanding in resiliency For every Soviet reactive threat considered, system effectiveness can be retained through more silos, concealment, simple countermeasures, or defense. Closely spaced basing alternatives place considerable stress on the Soviet threat effectiveness. Complex, qualitative Soviet advances (rather than just more firepower) would be required to increase attack effectiveness. Closely spaced basing alternatives, because of the relatively small deployment area, have favorable characteristics with respect to system expansion.

7.1.6 Defendability (U)

(U) An approach to increase the Soviet attack price and/or the survivability of U.S. intercontinental ballistic missiles is ballistic missile defense. Defendability refers to the ease and effectiveness of adding ballistic missile defense to each basing alternative and its compatibility with the Anti-Ballistic Missile Treaty.

(U) Defendability is not applicable for soft road mobile and deep basing. South side basing is rated marginal since potential terrain problems associated with site location and system configuration may impact the deployment of defense. The defendability of the Minuteman alternatives, hard road mobile, and widely spaced basing is rated fair. Attack

prices can be greatly increased with ballistic missile defense, but the number of interceptors required to defend the wide area makes it difficult to structure a treaty constrained system. Either point or area defense could be used to defend hard road mobile, but the resulting system would probably not be treaty compatible.

(U) Closely spaced basing (100/100 and 100/300) defendability is outstanding. The small deployment area makes a treaty constrained ballistic missile defense system possible and greatly increases defense effectiveness. The other closely spaced basing alternatives are rated good since the larger deployment area imposes some difficulties and may result in a non-treaty limited defense. Multiple protective shelters defendability is also good using preferential point defense to greatly increase the attack price. However, because of the larger multiple protective shelter deployment area, a treaty limited defense is not feasible.

7.2 SYSTEM FEASIBILITY (U)

(U) System feasibility criteria include cost, schedule, technical risk, operability/supportability, siting, environment, and public interface.

7.2.1 Cost (U)

(U) Costs for the baseline basing alternatives range from a low of $9.3B for Improved Minuteman III to a high of $76.2B for 1000 small missiles in closely spaced superhard silos. Costs include acquisition and operations and support based on a 10 year life cycle. The alternatives were categorized as follows:

Low Cost: Peacekeeper in Minuteman silos and improved Minuteman

Medium Cost: Closely spaced basing, closely spaced basing with concealment, widely spaced basing, and south side basing

High Cost: Multiple protective shelters, soft road mobile, hard road mobile, deep basing, and closely spaced basing with small missiles.

(U) The higher cost for multiple protective shelters and closely spaced basing with small missiles is due to the increased number of missiles and shelters. The road mobile costs are a combination of the larger number of missiles and high operating costs. Deep basing costs are driven by construction of the system facilities in the underground complex.

(U) All alternatives considered in this assessment have been costed on a consistent basis, with the best available system definition and cost data. Not all systems, however, enjoy the same degree of design maturity. There is considerable confidence in the costs for Peacekeeper alternatives in closely spaced basing and Minuteman silos. There is much less certainty in deep basing and road mobile costs, in part because the most cost effective configuration for these systems will be established by design tradeoffs during the advanced development phase. For example, an alternative hardened road mobile transporter capable of off-road operations may eliminate the need for the many miles of road construction assumed in the current estimate. Similarly, alternative alert schemes may reduce the very high operations and support costs associated with road mobile options. Thus, the relative design maturity of these options, which is suggested by their availability date, should be considered in weighing the relative costs of the various alternatives.

7.2.2 Schedule (U)

(U) The alternatives were evaluated on their capability to achieve initial operational capability in a timely manner. The ratings were grouped as follows:

- Outstanding – initial operational capability in 1986.
- Good – initial operational capability in 1987.
- Fair – initial operational capability in 1988.
- Marginal – initial operational capability in 1989.
- Poor – initial operational capability after 1990.

(U) Closely spaced basing, closely spaced basing with concealment, widely spaced basing, and Minuteman with Peacekeeper are outstanding. Improved Minuteman is rated fair since it is paced by the missile modifications. Others rated fair include multiple protective shelters and south side basing. The schedule for south side basing is paced by the need to conduct siting activities and the environmental impact analysis process. Multiple protective shelters is paced by the environmental impact analysis process and the large amount of initial construction required. The group consisting of the road mobile, deep basing, and closely spaced basing with small missiles is rated poor. The new small missile cannot be available until 1990 at the earliest, which delays initial operational

capability of alternatives with this missile. Deep basing requires significant research and development prior to deployment, as well as significant construction; all of which lead to a late initial operational capability.

7.2.3 Technical Risk (U)

(U) Improved Minuteman, closely spaced basing, widely spaced basing, and south side basing alternatives are judged to be good from a technical risk viewpoint. Peacekeeper in Minuteman is rated outstanding because of its low risk with no pacing technology issues. Alternatives using the superhard silo derive the risk related to the superhardened silo survivability. Analytic techniques supported by test data provide confidence in the constructibility of silos to specified requirements. However, some validation tests are required to fully evaluate the specific design concept and the performance of the missile shock isolation and egress system.

(U) Closely spaced basing with concealment and multiple protective shelters are rated fair. This rating is derived based upon risks associated with development of simulators and countermeasures for the concealment program.

(U) Road mobile alternatives, closely spaced basing with small missiles and deep basing are also rated fair. The small missile for closely spaced basing has some development risk associated with requirements to achieve accuracy and reduced missile weight. Validation tests will also be required on the smaller silo for assurance of hardness and egress capability. The road mobile alternatives require development of highly reliable vehicles, the hard road mobile vehicle also has risks in achieving the hardness. Deep basing depends on new technology related to missile egress.

7.2.4 Operability/Supportability (U)

(U) The operability/supportability ratings were based on assessments of operability, maintainability, security, and logistic subfactors. Road mobile on public highways is the only alternative receiving a poor rating. This is due to the difficult security problems and widespread maintenance and logistic requirements associated with the large deployment area. Hard road mobile on military installations is rated marginal. The smaller patrol area reduces the operability requirements. Multiple protective shelters is also rated marginal since the operations are over a large area. Improved Minuteman is outstanding since it would impose no change in current Minuteman operations. Minuteman with

Peacekeeper is judged to be good because the on-site missile assembly will increase maintenance, vehicle, and personnel requirements above current Minuteman. Closely spaced basing and closely spaced basing with concealment are also rated good; the small, fenced deployment area enhances security requirements, maintenance, and logistics.

(U) Widely spaced basing, south side, and closely spaced basing with small missiles are rated fair. The larger deployment areas complicate security, maintenance, and logistics, and require greater manpower. Deep basing is also rated fair due to the underground maintenance.

7.2.5 Siting (U)

(U) Siting assessments are based on the number of suitable geographical areas meeting system requirements, and the degree of confidence related to siting at these locations. Siting is outstanding for the Minuteman alternatives which use existing Minuteman silos. Closely spaced basing is also outstanding because several suitable sites have been identified and a basic siting decision has been made, with the proposed location near F. E. Warren Air Force Base. Widely spaced basing, closely spaced basing with concealment, and road mobile on public highways are rated good. The first two would require the same geology as closely spaced basing, but would require more area for siting. Road mobile has many siting opportunities within the existing primary and secondary road network; however, safety and security would impose significant constraints on the operating area.

(U) Closely spaced basing with small missiles is rated fair because the larger deployment area reduces the number of suitable locations compared to closely spaced basing. Deep basing is rated fair because of the limited number of potentially suitable locations and the uncertainty of geologic data at proposed depths. Multiple protective shelters is also rated fair based on the identification and study of suitable sites while it was an on-going program. South side is marginal since it has severe siting requirements and only a limited number of potential sites exist. Hard road mobile is also marginal because of the limited number of suitable military installations and potential mission conflicts at installations that have been identified.

7.2.6 Environment (U)

(U) The environment rating is based on consideration of projected socioeconomic, biology, water resources, land use, cultural resources, and air quality impacts. Multiple

protective shelters was the only alternative that rated poor. Based on the environmental impact statement prepared for this alternative, significant environmental impacts due to system size and the large deployment area could be expected for which numerous mitigation programs were required. South side, deep basing, hard road mobile, and closely spaced basing with small missiles rated marginal. Potential sites for south side and deep basing are all in remote locations where the in-migration of construction and operation personnel have high local impacts. Deep basing may lead to large overburden disturbances; and closely spaced basing with 1000 small missiles would be spread over a fairly large land area. Hard road mobile requires new roads to be built in areas adjacent to existing bases, as well as requiring a large number of additional personnel at these locations.

(U) Widely spaced basing, closely spaced basing with concealment, and soft road mobile would have moderate impacts and are rated fair. Closely spaced basing (100/100) would require a smaller construction force, have limited impacts, and is rated good. Improved Minuteman has virtually no impact and is rated outstanding. Minuteman silos with Peacekeeper is also outstanding since a relatively small increase in manning is required and minor modifications at existing sites would not cause significant impacts.

7.2.7 Public Interface (U)

(U) Public interface is defined as the degree of public exposure to fully assembled missiles with warheads. For closely spaced basing, public exposure to the missile and warhead is minimal because missile movements for maintenance and operations occur within secure areas. This alternative is rated outstanding.

(U) The Minuteman alternatives, closely spaced basing with concealment, and widely spaced basing are rated good. Movement of booster stages and unmated warheads for maintenance would be as currently done in the Minuteman system. Deep basing is also good since there would be limited movement outside the deep based complex.

(U) Closely spaced basing with small missiles, hard road mobile, and south side basing are rated fair. The closely spaced deployment (1000/1000) would be spread over large areas and supported from a single support center. Missiles with warheads mated would be moved for maintenance between the deployment area and this support center, which increases exposure to the public. This method of operation would also exist for south side.

Missile movements for hard road mobile would be restricted to military installations during normal operations.

(U) For multiple protective shelters, the wide area over which the assembled missile is moved results in a marginal rating. Soft road mobile is rated poor since this alternative requires constant movement of missiles with warheads mated over public highways.

7.3 POLICY (U)

7.3.1 Arms Control (U)

(U) In the area of arms control, the alternative systems are assessed with respect to their compatibility with current policy not to undercut existing agreements and more importantly support for U.S. objectives in future strategic arms negotiations. Compatibility with the current policy of not undercutting "existing agreements" is assessed for reasons of comparative analysis, despite the fact that this policy is temporary, without legal standing and concerns arms control agreements that will have expired prior to the deployment of any of the options considered in this report (even if they currently were in effect). Subfactors used to assess compatibility with the "no undercut" policy regarding existing agreements include relocation or construction of additional fixed intercontinental ballistic missile launchers and launcher modernization constraints. All of the missile basing alternatives meet the criteria for compatibility with existing agreements. The superhardened alternatives (closely spaced basing, closely spaced basing with concealment, closely spaced basing with small missile, widely spaced basing, and south-side basing), could be perceived by some as not consistent with provisions prohibiting construction of additional fixed intercontinental ballistic missile launchers because they all employ protective silos to house deployed missiles. However, these alternatives are compatible because they entail the deployment of non-fixed launchers. The new silos are not the launchers but serve only to support the missile and protect it from attack. The actual launcher is the missiles' non-fixed canister which is transportable and contains all the equipment necessary to launch the missile. Mobile systems such as the road mobile alternatives and multiple protective shelters would be compatible with the provisions of SALT I and/or II if either were in effect at the time of deployment. Deep basing is considered compatible with existing agreements since it is a new basing concept not accounted for under existing agreements. Since modernization of existing fixed intercontinental ballistic missile launchers is compatible with existing strategic arms agreements,

basing the Peacekeeper missile in Minuteman silos or placing an improved Minuteman in Minuteman silos would be consistent with these agreements.

(U) Six subfactors are used to assess an alternative's support for U.S. START objectives: system availability, maintenance of an active missile production capability, force effectiveness (to permit deterrence to be maintained at significantly reduced force levels), near-term demonstration of an active U.S. modernization program (to provide U.S. negotiating leverage), credible prompt offensive capability that reduces effectiveness of the Soviet Union's large intercontinental ballistic missile forces and diminishes their utility (to provide Soviet incentive to negotiate reductions in intercontinental ballistic missiles) and adequate verification. With the exceptions of closely spaced basing (1000/1000 small missile) and south side basing, which are rated good, the baseline closely spaced basing and its variations are all rated outstanding according to these criteria. Deployment of a new intercontinental ballistic missile in these basing modes would give the United States the modern, effective, and flexible force that would support reduced inventories. The closely spaced basing variations also would provide significant negotiating leverage in START by demonstrating U.S. resolve to modernize (and with an active missile production program, to increase missile deployments if necessary) and counter Soviet capability that threatens U.S. strategic forces; thus, diminishing the utility of the Soviet Union's large intercontinental ballistic missile forces. The mobile options would require a reevaluation of the proposed START ceiling on ballistic missile launchers. Although closely spaced basing with concealment, road mobile, and multiple protective structures would require some additional cooperative measures to facilitate effective verification, other alternatives generally pose few verification problems.

(U) Closely spaced basing with small missiles and south side basing are rated good due to the fact that they would have a later initial operational capability than the other closely spaced basing alternatives. The later availability of these systems would reduce their contribution to U.S. START negotiating leverage relative to the other closely spaced basing alternatives.

(U) The multiple protective shelter alternative is rated good. Multiple protective shelters, like closely spaced basing (1000/1000) and south side basing, has a delayed initial operational capability. As a result, it would have a reduced contribution to U.S. START

negotiating leverage. Additionally, multiple protective shelters would require additional cooperative measures to facilitate effective verification.

(U) Deep basing was rated good, primarily for two reasons. First, the initial operational capability of the system, since it represents new technologies, would be later than other alternatives. This would reduce its contribution to U.S. START negotiating leverage. Second deep basing as currently designed would limit the capability for prompt response. This would lessen U.S. leverage for successful strategic arms negotiations if not deployed in conjunction with other basing modes. The improved Minuteman alternative was rated fair due to its lesser contribution to leverage in START. Although the improved Minuteman would increase U.S. prompt offensive capability, it would not represent as substantial an addition to U.S. military capability as would other alternatives since it would provide only for an increase in the capability of currently deployed weapons. In addition, this alternative would not represent an active modernization program in the same sense as other alternatives since it would not entail the maintenance of an active missile production line.

(U) Both of the road mobile alternatives were rated good primarily due to their delayed initial operational capabilities. This later availability was seen to reduce U.S. START negotiating leverage. Additional cooperative measures would be required for effective verification.

(U) Deploying the Peacekeeper in Minuteman silos would be compatible with SALT I and/or SALT II if either were in effect at the time of deployment. Additionally, the deployment would meet all of the criteria to support U.S. START objectives and was therefore rated outstanding.

(U) The Trident alternative would be compatible with the criteria derived from SALT I and/or SALT II if either were in effect at the time of deployment. Its deployment would generally support U.S. START objectives. However, the Trident alternative would not provide the same force flexibility at reduced levels found with a modernized Triad. In addition, because of the 1989 initial operational capability for the D-5 system and the lack of resolve to modernize the strategic Triad that this alternative represents, it would provide less U.S. START negotiating leverage than some other options. For these reasons, this alternative received a good rating.

7.3.2 Foreign Policy (U)

(U) The assessment of the implications of the various alternatives on U.S. foreign policy is based on the impact in two areas: U.S. deterrent credibility and support for NATO nuclear force modernization. Perception of support for NATO nuclear force modernization is likely to be influenced heavily by the availability of the system. A near-term deployment has greater influence on allied support of NATO nuclear force modernization than systems with later availability. Subfactors used included: near-term demonstration of U.S. resolve and will to modernize, perception of U.S. capability which matches Soviet efforts, contribution to flexible response capability, and the commitment to sovereign basing.

(U) With the deployment of a new intercontinental ballistic missile in any of the basing modes under consideration, U.S. military capability will be perceived as being significantly enhanced. The deployment decision is a clear signal of U.S. resolve to restore the strategic balance. However, the improved Minuteman alternative will face perceptual difficulties in terms of U.S. resolve to modernize and redress the strategic balance. It also does not add as substantially to U.S. military capability as do the other alternatives.

(U) All the intercontinental ballistic missile alternatives, except improved Minuteman, support NATO nuclear force modernization efforts by reinforcing the linkage between U.S. modernization and NATO modernization. The intercontinental ballistic missile alternatives are sovereign land-based which will help sustain key allied governments' support for NATO nuclear force modernization. Such deployment demonstrates the willingness of the United States to accept the same risks of modernization as that of its allies. Road mobile deployment, due to its similarity to the NATO nuclear force modernization program, provides a perceived linkage between U.S. and NATO modernization. However, the later initial operational capabilities of this system would have less influence on allied support for NATO nuclear force modernization. Other basing alternatives, such as closely spaced basing -small missile, south side basing, multiple protective shelter, deep basing, and the road mobile options share this limitation. For this reason they were rated good rather than outstanding. All of the alternatives would contribute to U.S. flexible response capability which is the backbone of the NATO deterrent. While improved Minuteman would provide modernized capability and would be

based on sovereign soil, the fact that it is a modification of an existing system rather than an all new system, would reduce the perception that the U.S. is committed to land-based force modernization.

(U) The Trident alternative could be construed as indicating an unwillingness to subject the United States homeland to the same basing risks we are asking NATO nations to assume. It could possibly be interpreted as an indication of a lack of resolve to modernize the Triad, and a drift towards a Dyad. In addition, the later initial operational capability of the system could provide less influence on current NATO nuclear force modernization. For these reasons it was rated marginal.

7.4 TRIDENT II (D-5) (U)

(U) Cancelling the land based intercontinental ballistic missile modernization program in favor of accelerating and expanding the Trident II (D-5) program would required that an increased portion of the strategic force workload be accomplished by the sea-based missiles and air-breathing (bomber/cruise missiles) forces. This would weaken the United States deterrent posture in two important ways. First, the United States eases the problem facing the Soviets by allowing their planners to concentrate on active and passive defense against only two strategic systems instead of three. Second, the United States reduces its hedge against degradation or failure of the remaining Triad elements.

(U) The earliest initial operational capability of Trident II is 1989 which cannot be accelerated. Under the current program or even with accelerated procurement, it would be 1993 before the D-5 could actually assume the hard target Single Integrated Operational Plan role that the Peacekeeper or other near-term intercontinental ballistic missile deployment could provide in the 1980s.

7.5 OBSERVATIONS (U)

(U) The results of the technical assessments, evaluations, and comparative assessment suggest the following:

- Minuteman silos, closely spaced basing (with or without concealment), and widely spaced basing, all with Peacekeeper, provide the earliest initial operational capability.

- Improved Minuteman in Minuteman silos and Peacekeeper in south side and multiple protective shelters can satisfy an initial operational capability schedule requirement of 1988.

- Small missile and common missile alternatives would not be available before 1990.

- Superhardening, including deep basing, complicates Soviet planning and increases attack price since the Soviet Union is forced to use larger yield weapons, reversing their trend of increased fractionation of their intercontinental ballistic missiles.

- Mobility creates additional difficulties for the Soviet Union, as they must develop techniques for locating the missiles and may have to restructure their force to threaten a mobile system.

- Large MIRVed missiles provide payload flexibility and economies because of their ability to deliver several hard-target capable warheads on one booster.

- Small, single warhead missiles provide basing flexibility and survivability through proliferation but have little flexibility for accommodating alternative payloads.

- Deployment of a new missile shows resolve to modernize and provides arms control negotiating leverage.

- Increasing the military capability of U.S. intercontinental ballistic missiles provides a major contribution to deterrence.

- Substituting Trident II for intercontinental ballistic missiles modernization would undercut the Triad by foregoing unique characteristics, which are essential for strategic deterrence, and in the long term move U.S. strategic forces toward a Dyad.

- Ballistic missile defense can raise Soviet uncertainty in attack outcome and increase the attack price. Alternatively, it can increase survivability against a fixed attack.

(U) Of the 11 baseline system alternatives studied, two do not appear to warrant further consideration in the context of current requirements for intercontinental ballistic missile modernization. These are south side basing and multiple protective shelters. South side basing has severe siting constraints, leading to great difficulties in finding suitable deployment areas. Additionally, it has limited survivability against projected and responsive Soviet threats and lack resilience. The major drawback to multiple protective shelters is the large deployment area and construction requirements. As a result, multiple protective shelter has high environmental impacts.

MODERNIZATION ALTERNATIVES

8.0 INTERCONTINENTAL BALLISTIC MISSILE MODERNIZATION ALTERNATIVES (U)

(U) As discussed in Section 1, intercontinental ballistic missile modernization is required because of the aging of our current intercontinental ballistic missile force, the lack of effectiveness of our intercontinental ballistic missiles against Soviet hard targets, limited flexibility in our current force to respond to new Soviet developments, and the vulnerability of our intercontinental ballistic missiles to current and projected Soviet threats.

(U) The review of intercontinental ballistic missile system alternatives indicated that each alternative has its strengths and weaknesses. Another important finding was that the Peacekeeper missile can provide the earliest initial operational capability. Further, the alternatives of Peacekeeper in closely spaced basing, closely spaced basing with concealment, widely spaced basing, and Minuteman silos are compatible with early initial operational capability. However, this should not be construed to mean that the other alternatives do not have merit.

(U) The results of the technical assessment and evaluation addressed each alternative for modernization of the intercontinental ballistic missile force in isolation. However, intercontinental ballistic missiles represent only one element of our strategic forces. Future intercontinental ballistic missile deployments must be viewed in terms of how they combine with other current and planned strategic forces in the Triad to complicate Soviet attack planning, reduce Soviet confidence in overall attack success, and stress Soviet technical developments. When viewed in a Triad context, shortcomings of some of the alternatives may disappear.

8.1 SELECTION OF AN INTERCONTINENTAL BALLISTIC MISSILE MODERNIZATION APPROACH (U)

(U) A key objective in selecting a path for intercontinental ballistic missile modernization is that our intercontinental ballistic missile force be resilient. That is, we must select an approach that will contribute to strategic force effectiveness into the 21st Century. In the past, we have tried to reach a single solution for intercontinental ballistic missile modernization, and the above results indicate that some systems can meet near-term requirements and, by themselves, remain effective against Soviet reactive development through the addition of growth options. However, an alternative approach would be

Table 8-2. (U) Near-Term Deployment Alternatives

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Alternative	Advantages	Disadvatages
Peacekeeper in Minuteman silos	• Increased hard target capability • Increased negotiating leverage • Low deployment cost • Demonstrates resolve to modernize • Low technical risk	• Does not require Soviet Union to develop new threats • Low resiliency; BMD only option for increasing effectiveness • Low survivability
Improved Minuteman in Minuteman silos	• Increased hard target capability • Very low deployment cost	• Reduced negotiating leverage; weaker resolve • Does not require Soviet Union to develop new threats • Low resiliency; BMD only option for increasing survivability • Prolonged life required for aging Minuteman force • Limited flexibility to respond to Soviet superhardening • Low survivability
Peacekeeper in new superhard silos (wide spacing)	• Increased hard target capability • Increased negotiating leverage • Demonstrates resolve to modernize • Forces Soviet Union to reverse-fractionate; develop larger yield weapons	• Requires near-term superhardening technology validation • Low effectiveness against responsive Soviet threats
Peacekeeper in new superhard silos (close spacing)	• Increased hard target capability • Increased negotiating leverage • Demonstrates resolve to modernize • Forces Soviet Union to reverse-fractionate; develop larger yield weapons • Forces Soviet Union to develop new attack strategies; develop advanced threats • High resiliency; countermeasures, concealment, and BMD	• Requires near-term superhardening technology validation • Complexity makes it difficult to convince laymen of viability

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8.2 COST TO THE SOVIET UNION OF UNITED STATES INTERCONTINENTAL BALLISTIC MISSILE MODERNIZATION (U)

(U) A major consideration in selecting an approach to intercontinental ballistic missile modernization is the cost it imposes on the Soviet Union. Generally there are three kinds of potential "costs" imposed on the Soviet Union by a modernized United States intercontinental ballistic missile force. These costs are:

- **Economic** – Fiscal expenditure necessary to address this new strategic capability, if feasible.
- **Military** – Reduced capability relative to the United States.
- **Political** – International perception that the "correlation of forces" is no longer shifting in their favor.

In combination, these costs will increase deterrence and the stability of the United States-Soviet strategic relationship by reducing the Soviet confidence in their ability to successfully wage nuclear war.

8.2.1 Economic Cost (U)

(U) The deployment of a new intercontinental ballistic missile may cause the Soviet Union to spend resources to respond. If the threat can be countered with the current or projected arsenal, then the costs are quite low. The costs would be greater if development of new weapons or the expansion of existing deployments are necessary. However, historically it is not clear that these costs are a deterrent to Soviet deployment or modernization programs. It is difficult to argue that the Soviet Union has not developed a particular weapon system because of cost alone. Therefore, fiscal expenditures are a minor consideration. The military and political costs dominate.

8.2.2 Military Cost (U)

(U) The military costs are not easy to calculate. The simplest is action/reaction. It suffices to say that, depending on the basing mode selected, a wide range of costs are possible. The more difficult the attack problem, the greater the operational planning uncertainties.

(U) Assuming the current Soviet inventory of weapons is fully committed, exacting a higher price to attack the modernized intercontinental ballistic missile force would increase the military cost to them and enhance deterrence. Soviet targeting plans are believed to stress very high damage levels against United States nuclear forces and high confidence in operational effectiveness. Therefore, if more weapons are needed to attack intercontinental ballistic missiles effectively, other missions must suffer or the Soviet force would have to be expanded. Another related cost is the amount of time required to execute the intercontinental ballistic missile attack. If the attack has to be expanded in time, the successful completion of this attack can be disrupted.

(U) A related but more important cost is that of decreasing the Soviet's confidence in their ability to wage nuclear war successfully. The intercontinental ballistic missile modernization should not be viewed in isolation, but as a part of the overall strategic modernization program. The improved capability and flexibility of the modernized Triad will enhance our ability to deny Soviet war aims. This will make such a conflict less likely. Deterrence calls for a military capability sufficient to ensure the ability to retaliate effectively and destroy with high confidence the aggressor's highly valued assets such that the cost of the war to him is unacceptable. The principal Soviet objectives in a nuclear war appear to be the destruction of United States strategic forces; continuity of wartime Party and State leadership; survivability of military forces and related command, control, and communications to achieve final victory; and survivability of their industries to support a protracted war and post-attack recovery.

(U) In support of these war aims, the Soviet Union has sponsored massive hardening programs for its political leadership and military command and control systems. It has developed extensive plans for dispersing most elements of its military forces during a crisis and plans for recovery of selected industries. An improved United States hard target retaliatory capability would counter these Soviet survivability steps. This would improve the United States deterrence posture relative to Soviet perceptions of the cost of a nuclear war.

(U) The military cost imposed on the Soviet Union by intercontinental ballistic missile modernization could be significant. Possessing the combination of accuracy, reliability, timeliness, and precise control, intercontinental ballistic missiles are ideally suited to provide the prompt and reliable firepower necessary for successful retaliation

against war-essential hardened military targets. Nearly all of the intercontinental ballistic missile force is always ready, there being no complicated procedure necessary to ready the force, and intercontinental ballistic missiles can remain on alert indefinitely. They possess reliable communications allowing immediate launch following the appropriate command. Except for a limited number of weapons that might be lost to the antiballistic missile system that defends Moscow, intercontinental ballistic missiles are not vulnerable to defenses. Excellent reliability of intercontinental ballistic missiles ensures that almost all their targets will be struck within 30 minutes of a launch.

(U) The problem for Soviet war planners is complicated significantly by the need to plan a specialized attack against the intercontinental ballistic missile force while attacking other elements of the United States strategic arsenal. Furthermore, United States countermeasures against potential Soviet responsive attack options, if deployed, would greatly complicate the attack problem. These complications translate directly into operational planning uncertainties. The resulting loss of confidence in their ability to wage war successfully is perhaps the most significant "cost" imposed on the Soviet Union by an improved, more effective intercontinental ballistic missile force.

8.2.3 Political Cost (U)

(U) The political cost to the Soviet leaders imposed by improvements to the United States intercontinental ballistic missile force is the most problematic cost to assess. It is likely to be manifested in three ways: internally, externally, and in START/INF. The internal political cost is difficult to assess, but might entail the need to reevaluate their fundamental nuclear doctrine. As for the external political cost, it is likely to take the form of increased difficulty in convincing their current and potential allies that the "correlation of forces" has shifted and will continue to shift in their favor. In the late 1960s and 1970s, the Soviet Union made considerable gains in convincing some elements in the West and the Third World that the United States was weakening in its resolve to protect our own and our allies' security interests. A United States decision to deploy an improved intercontinental ballistic missile will challenge this conviction. Finally, a United States decision to modernize its intercontinental ballistic missile force most certainly will affect favorably the Soviet commitment to serious negotiations in both START and the INF, with enhanced prospects for meaningful reductions as a result.

8.3 INTERCONTINENTAL BALLISTIC MISSILE MODERNIZATION PROGRAM ALTERNATIVES (U)

(U) Based on the above, four intercontinental ballistic missile modernization program alternatives have been structured. Each consists of a near-term deployment, a technology development, and potential follow-on deployments, as shown in Table 8-1.

Table 8-1. (U) ICBM Modernization Program Alternatives

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Alternative	Near-Term Deployment	Technology Development Program	Potential Follow-On Deployment
A	Peacekeeper in Minuteman silos	• Superhard silos • Small missile • Hard road mobile • Deep basing • Ballistic missile defense	• Peacekeeper in -Superhard silos -Deep basing • Small missile continuation • Ballistic missile defense
B	Improved Minuteman in Minuteman silos	• All of those above • Peacekeeper missile development and test	• Peacekeeper in -Superhard silos -Deep basing • Small missile continuation • Ballistic missile defense
C	Peacekeeper in new hard silos (wide spacing)	• Small missile • Hard road mobile • Deep basing • Ballistic missile defense	• Peacekeeper -Backfill to close spacing -Deep basing • Small missile continuation • Ballistic missile defense
D	Peacekeeper in new hard silos (close spacing)	Same as C	• Peacekeeper - Deep basing • Small missile continuation • Ballistic missile defense

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8.3.1 Alternative A (U)

(U) Alternative A consists of near-term deployment of Peacekeeper in Minuteman silos; technology development of superhardening, small missile, mobility, deep basing, and ballistic missile defense; and potential follow-on deployment based on the results of the technology development program. Near-term deployment of Peacekeeper would provide increased prompt hard-target capability. It would result in a significant force addition as

three warhead Minuteman IIIs would be replaced with 10 warhead Peacekeepers of improved accuracy. It also would provide the flexibility to incorporate alternative payloads (e.g. larger yield warheads) and continue to be effective against Soviet targets should the Soviet Union initiate a superhardening program.

(U) This alternative would demonstrate United States resolve to modernize our intercontinental ballistic missile force through the initiation of production of the Peacekeeper missile. Active missile production and the capability to reduce the effectiveness of Soviet offensive systems would increase arms control negotiating leverage. Another advantage is the low initial acquisition cost of this alternative. However, there are some shortcomings. The Soviet Union would not be required to develop new threats to attack the system, as it would have the same vulnerabilities as our current Minuteman force. Also, this near-term deployment would have low resiliency, with the ballistic missile defense the only option for increasing its effectiveness.

(U) The technology development program that would accompany near-term deployment of Peacekeeper in Minuteman silos would force the Soviet Union to plan for a variety of potential deployments. This would impose substantial economic, military, and political costs. Superhardening technology validation would force the Soviet Union to plan for reverse-fractionation of their missiles and develop larger yield, more accurate weapons. The small missile development would provide future basing flexibility and could lead to deployment of a mobile system or a large number of superhardened silos. To attack a mobile system, the Soviet Union would have to develop the means to locate and track the missiles and deploy warheads compatible with a large area barrage attack. These warheads may be totally different than those required for attacking superhard silos. Deep basing would further complicate Soviet planning, as there are no current or projected threats to this system, and it could provide an enduring strategic reserve force. Ballistic missile defense would require the Soviets to develop new attack strategies and possibly new threats.

(U) Based on the results of the above technology programs, potential follow-on deployments for this alternative include Peacekeeper in superhardened silos (close spacing), the small missile in a mobile mode or superhardened silos, Peacekeeper in deep basing, and the addition of ballistic missile defense. These alternatives provide substantial leverage and flexibility to respond to any Soviet action taken in response to our near-term deployment and technology development program.

8.3.2 Alternative B (U)

(U) Alternative B is similar to Alternative A, except that it would improve our current Minuteman force, as opposed to deploying new Peacekeeper missiles in Minuteman silos. As a result, there would not be as significant an addition to our intercontinental ballistic missile force. We would have increased prompt hard target capability, but overall force size would remain constant. Because this deployment would not involve production of a new missile it is likely to be perceived as demonstrating less resolve to modernize our intercontinental ballistic missile force. The absence of a new missile production line, and the fact that there is not as significant a force addition as for other alternatives, could lead to reduced arms control negotiating leverage.

(U) This alternative would have very low initial acquisition costs. However, it would require prolonging the life of our aging Minuteman force, which may lead to frequent subsystem refurbishment requirements. The small throwweight of the Minuteman III would provide limited flexibility to respond to a future Soviet superhardening program. The shortcomings of the Alternative A near-term deployment would remain for this alternative. The technology development program would include the same elements as Alternative A with the addition of continuance of the Peacekeeper missile development and test program. This will allow the benefits of the potential follow-on deployments to remain.

8.3.3 Alternative C (U)

(U) Alternative C would entail near-term deployment of Peacekeeper in widely spaced, superhardened silos. Increased military capability would be equivalent to Alternative A. The near-term deployment would have all the advantages of the Alternative A near-term deployment. Additionally, it would impose an immediate cost on the Soviet Union. The Soviet Union would have to develop a larger, more accurate warhead and reverse-fractionate to threaten the system. Production of the new missile combined with this would likely lead to increased negotiating leverage. Deployment of Peacekeeper in widely spaced superhardened silos would require near-term superhardening technology validation. Although it would stress current Soviet capabilities, its effectiveness against projected and responsive Soviet threats would be low. Technology development would concentrate on the small missile, mobility, deep basing and ballistic missile defense with benefits similar to those described for the previous alternatives.

8.3.4 Alternative D (U)

(U) Alternative D is similar to Alternative C, except that the near-term deployment would be in closely spaced, superhardened silos instead of widely spaced silos. Increased military capability would be provided. This approach would have all the advantages of Alternative C and impose further immediate costs on the Soviet Union. They would have to develop new attack approaches and threats, in addition to reverse-fractionating. to threaten the system. The near-term deployment would have high effectiveness, even against projected Soviet threats. This should lead to even greater negotiating leverage. Like Alternative C, this option would require near-term superhardening technology validation. Its technology development program would be identical to Alternative C, with benefits similar to those of the other alternatives.

8.3.5 Summary (U)

(U) The potential advantages and disadvantages of the various elements of the alternatives discussed above are summarized in Tables 8-2 through 8-4.

Table 8-2. (U) Near-Term Deployment Alternatives

UNCLASSIFIED

Alternative	Advantages	Disadvatages
Peacekeeper in Minuteman silos	• Increased hard target capability • Increased negotiating leverage • Low deployment cost • Demonstrates resolve to modernize • Low technical risk	• Does not require Soviet Union to develop new threats • Low resiliency; BMD only option for increasing effectiveness • Low survivability
Improved Minuteman in Minuteman silos	• Increased hard target capability • Very low deployment cost	• Reduced negotiating leverage; weaker resolve • Does not require Soviet Union to develop new threats • Low resiliency; BMD only option for increasing survivability • Prolonged life required for aging Minuteman force • Limited flexibility to respond to Soviet superhardening • Low survivability
Peacekeeper in new superhard silos (wide spacing)	• Increased hard target capability • Increased negotiating leverage • Demonstrates resolve to modernize • Forces Soviet Union to reverse-fractionate; develop larger yield weapons	• Requires near-term superhardening technology validation • Low effectiveness against responsive Soviet threats
Peacekeeper in new superhard silos (close spacing)	• Increased hard target capability • Increased negotiating leverage • Demonstrates resolve to modernize • Forces Soviet Union to reverse-fractionate; develop larger yield weapons • Forces Soviet Union to develop new attack strategies; develop advanced threats • High resiliency; countermeasures, concealment, and BMD	• Requires near-term superhardening technology validation • Complexity makes it difficult to convince laymen of liability

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Table 8-3. (U) Technology Development Alternatives

UNCLASSIFIED

Alternative	Features
Superhardening	• Forces Soviet Union to plan for reverse-fractionation; develop larger yield weapons • Provides option for follow-on deployment in superhardened silos • Permits exploitation of fratricide which forces the Soviet Union to develop all new attack strategies and weapons
Small Missile	• Basing flexibility; provides potential for mobile or superhardened silo deployment; would complicate Soviet planning
Mobility	• Forces Soviets to develop methods of locating and tracking missiles • Different attack requirements
Deep Basing	• No current or projected Soviet threat to the system; would greatly complicate Soviet planning • Could provide enduring strategic reserve force
Ballistic Missile Defense	• Compatible with a variety of initial deployments • Could complicate Soviet attack planning/threat development

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Table 8-4. (U) Follow-On Deployment Alternatives

UNCLASSIFIED

Alternative	Advantages	Disadvatages
Peacekeeper in new superhard silos (close spacing)	• Forces Soviets to reverse-fractionate; develop larger yield warheads • Complicates Soviet attack planning; requires new threats • Additional prompt hard-target capability	• Dependent on success of superhardening technology validation
Small Missile in superhardened silos	• Forces Soviets to reverse-fractionate; develop larger yield warheads • Additional prompt hard-target capability • Large number of silos leads to high survivability	• High cost • Dependent on success of superhardening technology validation • Dependent on success of small missile development/validation
Small Missile in Road Mobile	• Complicates Soviet attack planning; requires new threats • Promises high survivability	• High cost • Possible complicated operation and maintenance • Possible nuclear safety and security issues • Hard mobile dependent on success of hardness technology validation for vehicle
Deep Basing	• Forces Soviets to reverse-fractionate; develop larger yield warheads • Complicates Soviet attack planning; requires new threats • Promises very high survivability • Enduring, secure reserve force	• High cost • Lacks prompt response • Dependent on success of egress technology development
Ballistic Missile Defense	• Increased Soviet attack price • Complicates Soviet attack planning	• May only require increased Soviet force, but no new technology threats to attack

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APPENDIX I TERMS AND GLOSSARY

Appendix 1

TERMS AND GLOSSARY (U)

A.1 TERMS (U)

Accuracy (U)

(U) Our missiles can be targeted with greater accuracy when they are launched from a point whose precise location is known. In the case of fixed, land-based launch sites, the location of the launch site has been surveyed and is known to within a few feet relative to the location of the target. No new information is needed at launch time.

(U) In the case of any mobile system, it is essential to determine the precise location of the vehicle at the time launch takes place. Land-based mobile systems can make use of presurveyed bench marks located at close intervals over the area of their operation, especially if the carriers are limited to defined routes (roads, rails, waterways). Off-road systems present a more difficult problem of precise determination of location.

(U) A possible solution for all mobile systems is to have the missile's trajectory corrected after launch, using precision location information determined by the global positioning system. The global positioning system is a system of satellites specifically designed to provide very accurate determination of both position and velocity by a triangulation procedure.

(U) The primary drawback of using the global positioning system is that the satellites may be the first objects of enemy attack, leaving our intercontinental ballistic missiles with severely reduced accuracy. It is preferable to keep the accuracy of the missile independent of any external information.

Warning (U)

(U) The United States has in place a number of effective detection and warning systems that are capable of reporting a variety of activities in the Soviet Union, including the launch of missiles. These systems are intended to provide notice of an impending attack. However, if our first alarm is the actual launch of intercontinental ballistic missiles in our direction, we will have, at most, half an hour to respond.

(U) Some intercontinental ballistic missile basing alternatives scatter our intercontinental ballistic missiles on warning. However, we would prefer a system that does not depend on warning. Our present intercontinental ballistic missile force does not, whereas bombers necessarily do. If the early warning system should fail for any reason, these intercontinental ballistic missiles would be "sitting ducks" for a small number of warheads.

Hardness (U)

(U) If a component of an intercontinental ballistic missile system is to survive an attack, it must be "hard" enough to withstand the effects of a nuclear explosion targeted by the optimum strategy against that given type of target. That is, if the component (say a commercial-type vehicle or an aircraft) is "soft," an explosion at a considerable distance can damage or destroy it. If it is hard, like a superhard silo, the explosion must be extremely close before it will disable the silo.

(U) Hardness is usually expressed in pounds per square inch of pressure a component can withstand; this pressure is highest at the center of the blast and drops off with distance, as shown in Figure 1. The blast pressure alone may not be the physical cause of the damage, which may be due to other nuclear effects such as heat and radiation, but it is a convenient measure for comparing different systems and for determining the required spacing of targets.

(U) Since soft targets must be spaced farther apart than hard targets, the area they occupy is greater. Figure 2 shows how area increases with decreasing hardness for a given survivability. The large areas required by soft targets is an important factor in evaluating many intercontinental ballistic missile deployment alternatives.

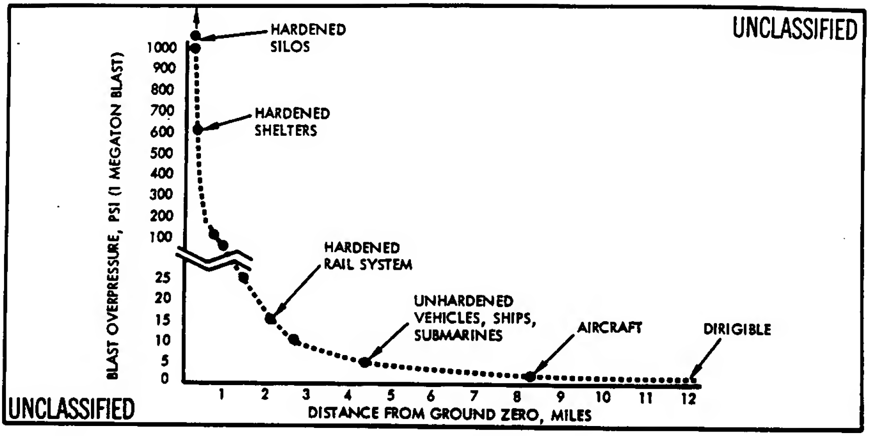

Figure 1. (U) To survive a nuclear explosion, a target has to be hard enough to withstand the overpressure, which drops off rapidly with distance. There is= always a choice between hardening the target or giving it a change of being far enough away, or some of each.

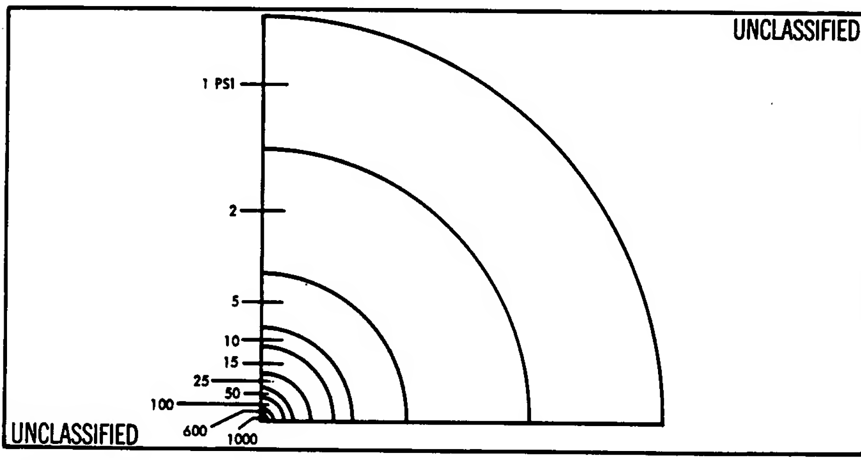

Figure 2. (U) Deployment area required by a survivable system grows as the hardness of the shelters or carriers decreases. With 1-psi targets, a 1-megaton blast can demolish any target in an area of 441 square miles. With targets hardened to 1000 psi, the same blast is effective over only 3/10th of a square mile.

A.2 GLOSSARY (U)

(U) **Airborne Launch Control Center.** A force of United States aircraft which can communicate with and launch Minuteman missiles from their silos and which will be able to launch the Peacekeeper missile force.

(U) **Alert.** A state of readiness indicating that an aircraft or missile can be launched promptly on command.

(U) **Base.** The locality or the installations on which a military force relies for supplies, or from which it initiates operations.

(U) **Booster.** The rocket motor, or motors, of a missile providing thrust for the launch and initial part of the flight.

(U) **Canisterized Missile.** A missile contained in and launched from a canister (silo).

(U) **Dash-On-Warning (Scatter-On-Warning).** A missile operational mode whereby the missile carrier moves away from its normal station upon warning that an enemy missile attack has either been launched or is imminent.

(U) **Deploy.** To extend and arrange military units to appropriate positions over an area.

(U) **Dispersal Site (Dispersal).** The area or locations to which missile carriers move in response to an attack warning.

(U) **Global Positioning System.** A constellation of United States Air Force satellites which a vehicle on or near the earth can use to determine its position or location with a high degree of accuracy.

(U) **Guidance System.** A system which controls the course of a missile, usually by built-in mechanisms.

(U) **Hard Target.** An object which can withstand more than a nominal amount of explosive blast pressure.

(U) **Launch Control Center.** A hardened underground facility from which Minuteman operators can control the launch of from 10 to 50 Minuteman missiles. More generally, the launch control facility for any land-based missile system.

(U) **Launch-Critical.** These elements of a missile system whose proper operation is essential to a successful launch.

(U) **Launcher.** The integral electronic and mechanical equipment needed to monitor, operate, and assist the missile in its launch.

(U) **Launch-On-Warning.** A force employment tactic to increase weapon system survivability by launching forces under attack prior to threat arrival, based on tactical warning. This procedure is currently used to achieve U.S. bomber survivability. This tactic is susceptible to spoof or loss of warning systems.

(U) **Launch Under Attack.** A force employment tactic to increase weapon system survivability by launching forces as soon as possible after the start of nuclear detonation on the system. Launch occurs later than with launch-on-warning, but is based on more positive evidence of attack. This tactic is susceptible to disruption by nuclear detonations on systems trying to launch.

(U) **Liquid-Fueled.** A type of missile using liquid propellants and oxidizers as a source of energy and thrust.

(U) **Maneuvering Reentry Vehicle.** An advanced type of reentry vehicle capable of altering its atmospheric reentry trajectory by manipulating its aerodynamic surfaces. Trajectory corrections can be initiated either by built-in sensors or by external means, such as satellite command (see reentry vehicle).

(U) **Megaton.** The nuclear explosive power equivalent to one million tons of a chemical high explosive, such as trinitrotoluene.

(U) **Minuteman (Minuteman II, Minuteman III).** A United States Air Force intercontinental ballistic missile. The missile has three solid propulsion stages which ignite and separate in sequence so as to place a reentry vehicle or vehicles in ballistic trajectory above the atmosphere. The reentry vehicle reenters the atmosphere and impacts at the target point. Minuteman II has a single reentry vehicle. Minuteman III has three reentry vehicles which are independently aimed at three targets by a liquid propelled fourth stage. Both types of Minuteman are based in hardened and dispersed facilities (silos) in the United States Midwest.

(U) **Minuteman Wing.** The largest grouping of Minuteman missiles located in one general area. A wing consists of three or four squadrons, each squadron containing 50 missiles in five flights of 10 missiles. There are six wings, with their headquarters in the states of Montana, South Dakota, North Dakota (two bases), Missouri, and Wyoming.

(U) **Poseidon.** The second generation United States submarine-launched ballistic missile system. The missile carries a number of reentry vehicles which can be independently aimed. Its range is more than that of Polaris but less than that of an intercontinental ballistic missile.

(U) **Precursor Attack.** A nuclear missile attack initiated in advance of the main attack. A precursor attack might consist of a relatively small number of nuclear detonations designed to make the main attack more effective. An example would be detonations to disrupt communications.

(U) **Radio Link.** Those portions of a missile command or communication system involving radio transmission, or a type of missile guidance system involving radio command to a missile in flight.

(U) **Random Move.** An operational procedure for mobile missiles. It may involve instructions to proceed to a randomly selected destination, or instructions to proceed for a randomly selected time in a given direction, followed by a randomly selected change in travel direction.

(U) **Reentry Vehicle.** A vehicle that is propelled above the earth's atmosphere by a ballistic missile and then follows a trajectory that causes it to reenter the atmosphere.

(U) **Shelter.** In the context of this report, a hardened facility housing a missile, or possibly its simulator. A shelter can house the missile in either a horizontal or vertical position.

(U) **Silo.** A facility used to house missiles, currently the Titan and Minuteman missiles. The Minuteman silos are vertical cylindrical cavities dug into the ground and lined with concrete and steel and contain the equipment necessary to launch the missile. Their covers are approximately level with the surface of the ground.

(U) **Simulator.** An object which is intended to be indistinguishable from a real missile when monitored by sensing devices.

(U) **Strategic Air Command.** That part of the United States Air Force which operates the nuclear armed intercontinental land-based missile force (Titan and Minuteman), the long-range bomber force (B-52 and FB-111 type aircraft) and certain long-range reconnaissance aircraft such as the SR-71 type.

(U) **Strategic Warning.** Some indication that an attack is imminent with the warning being received before the launch of such an attack. Strategic warning can be based on force movements, on efforts to bring strategic forces to a high state of alert, and on agent reports.

(U) **Tactical Warning.** An indication that an attack has been launched and which is received and transmitted to the targeted forces prior to enemy missile impacts. From the definition, tactical warning time cannot be greater than intercontinental missile flight time, usually considered to be 30 minutes. Shorter warning times are possible and likely if the attacking weapons are launched from submarines. For systems immune to Soviet submarine-launched ballistic missile attack, the time between early submarine-launched ballistic missile impacts and the arrival of Soviet intercontinental ballistic missile weapons (up to 25 minutes) can be generally used for safe launch.

(U) **Timely Execution.** A National Command Authority strategic force execution decision which launches U.S. intercontinental ballistic missiles after Soviet submarine-launched ballistic missile nuclear detonations on U.S. soil, but prior to Soviet intercontinental ballistic missile detonations on U.S. intercontinental ballistic missile fields.

Several basic conditions must exist for Timely Execution to be feasible. First, the Soviets must launch their intercontinental ballistic missiles and submarine-launched ballistic missiles at the same time so that the maximum interval exists between the first submarine-launched ballistic missile weapon detonation in the U.S. and the first Soviet intercontinental ballistic missile weapon detonation in the U.S. Second, the sum of warning time, National Command Authority decision time, and system reaction time must be less than the interval (approximately 20-25 minutes) between the first Soviet submarine-launched ballistic missile detonation and the first Soviet intercontinental ballistic missile detonation.

(U) **Triad.** The three elements of the United States strategic nuclear force--intercontinental ballistic missiles, submarine-launched ballistic missiles, and bombers.

(U) **Trident.** A third generation United States submarine-launched ballistic missile with three solid stages capable of delivering independently targeted reentry vehicles to intercontinental distances. Also, the submarine carrying the missile.

(U) **Warhead.** In the context of this report, the nuclear explosive device carried by the reentry vehicle of a ballistic missile.

(U) **Warning System.** The sensing and communication systems which gather indications of an imminent or actual enemy missile launch and which transmit such information to the National Command Authorities and then to the forces threatened by the attack.